AMALGAM ELECTRICAL MACHINES (S. Berry).—An amalgam for the cushions of electrical machines is made of 2 parts zinc, 5 mercury, 1 tin, and rub the cushions with a mixture of beeswax and tallow before application. [35

Aurora. Corona found at the point of the sky to which the dipping needle points. Humboldt's Cosmos p. 182

Aurora artificially produced.
The light produced between two Carbon points in the Voltaic Circle placed at a distance from each other — is like the Aurora; and the light is attracted or repelled by the magnet. Cosmos p. 187.

Atmosphere height of. By duration of twilight, about 45 miles. By barometer — stratum 12 or 13 miles high contains $\frac{29}{30}$ of atmosphere.
Dalton's Essays p. 76–7

Air charged with water vapour specifically lighter than free air. Dalton's Essays p. 100

Articulation — Teachers of Artic. who have volunteered to assist in the formation of a ~~[illegible]~~ Dictionary for Artic. + Lip - Reading.

A P Miss Emeline Fish — Peru Ind.
B Q Miss Rich — 80 Mt. Vernon
C R Miss Littlefield — 34 Princeton
D S Miss Jones — Westfield Mass.
E T Miss Mack — Belmont, Mass.
F U Mrs. Crozier — 223 Main St. Charles[town]
G V Miss Farrant — Salem Mass.
H W Miss McGann — Belleville [illegible]
I, J Miss Summers — Jamaica Plain
K X Miss Clarke Crescent Av! Dorchester
L Y Mr. Crane —
M Z Mr. Flower —
N Miss Jordan —
O A. G. B.

SPRINKLING THE EDGES OF BOOKS.

SIR,—In reply to "A Subscriber, J. M. G." (page 251, No. 219, vol. 9), the following is a good way to sprinkle the edges of books. Take an old toothbrush and dip it into a coloured ink, shake off the superfluous ink that the sparks formed may not be too large, and draw an old comb through it in such a manner as to make the ink fly off in sparks over the edges of the book. The following are a few coloured inks, and the way to make them:—

Red. ½ lb. of the best logwood is boiled with 1 oz. of pounded alum, and the same quantity of cream of tartar, with half the quantity of water, and, while the preparation is still warm, 1 oz. sugar and 1 oz. gum-arabic are dissolved in it.

Blue. Solutions of indigo, with pieces of alumina, and mixed wiith gum, forms a blue ink.

Green. This ink is obtained from verdigris, distilled with vinegar, and mixed with a little gum,

Yellow. Saffron, alum, and gum-water, form a yellow.

These inks also do very well for writing with.

Paste Blacking

4 oz. Ivory black, 3 oz. Coarse sugar, one tablespoonful of sweet oil, 1 pint of small beer. Heat them together and keep stirring till cold

[205.]—**HEATING BATH.**—As no one else has answered this, I venture to send a few lines with reference to a plan which I have used myself, and found useful. The apparatus required is a tin can, such as varnish is kept in, a cork fitting the mouth of the can, and a few feet of ordinary tin gas pipe. Bore a hole through the cork just large enough to allow of the insertion of the pipe, the other end of which is to be put down nearly to the bottom of the cold water in the bath. The water in the can must be made to boil, and the steam being condensed in the bath-water will speedily raise it to the necessary heat. The most convenient mode of heating the water, if "K. B. W." has gas at command, is by using what I think is called a Bunsen stove, in which a mixture of gas and common air is burned on top of a wire gauze. If this plan is not available the can may be placed on an ordinary fire.—G. BENTLEY, Brighton.

TO PREVENT BEER FROM GROWING FLAT.—Into a cask, containing eighteen gallons of beer becoming vapid, put a pint of ground malt suspended in a bag, and close the bung perfectly. The beer will be improved during the whole time of drawing it for use.

SELF-REGISTERING ANEROID BAROMETER.—This instrument is designed to show at a glance the various fluctuations that have taken place in the barometer. It consists of an aneroid barometer and an eight-day clock, each with eight-inch dials. Between these is placed, in a vertical position, a cylinder four inches in diameter, having a paper attached to it ruled to coincide with the barometer scale. Near to this paper a pencil, guided by a rod of metal, is moved up and down as the action takes place in the aneroid, and at every hour the pencil is made to mark the paper by simple mechanism connected with the clock. By this means a black dotted curved line is produced, showing at a glance the height of the barometer, whether it is falling or rising.

MANGANESE BATTERY.

SIR,—In reply to "Y. S.," who has failed to make the manganese battery work satisfactorily, I beg to say that he should use broken retort carbon to mix with his manganese instead of coke.

The action involves a deoxidation of the metallic binoxide, but it does not seem to go on except in immediate proximity to the conducting carbon. Hence the broken bits of carbon with which the porous cell is filled may be regarded as ramified conductors to the central plate or block.

I have four quart cells which have now been working an electrical clock for the last four months without any indication of failing. Indeed, on the advice of the intelligent superintendent of the electric clock at Dover, on the London, Chatham, and Dover Railway premises, I diminished the power to two cells, with decided advantage. His opinion was that the four quart cells would work his big clock with four six-feet faces.

I put a rod of hard carbon into a six-inch porous pot, and fill it with broken bits of carbon, about the size of a pea. Then I flake in dry binoxide of manganese, till the cell is full. When the sal ammoniac solution is poured in, the binoxide sinks, and needs filling in. I cover the top of the carbon rod with platina foil, as the fluid creeps up and destroys both copper and tin. The zinc is amalgamated, and need not be large, as it wears very little.

It is a very cheap battery, costing about 2s. for a quart cell. I find it stronger than the sulphate of lead cell. I shall be happy to show it to any brother reader. W. H. STONE, F.R.C.P.

13, Vigo-street.

12 GALVANIC BATTERIES AND PHILOSOPHICAL APPARATUS, ETC.

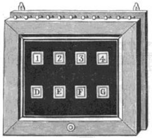

Fig. 19D

Barometer – Chief Facts relating to. See Dalton's Essays p. 92

Barometer. Mercury depressed by S.W. wind – elevated by N.E. Explained by Mr Meikle of Edinburgh.

The Boiling Point of a liquid is that temperature at which the tension of its vapour exactly balances the pressure of the Atmosphere.

Bede. Of the Historie of the Church of England – Transl. by Stapleton 1622 First edition of translation 1565. (See Lacy & Faunb.)

Book V – Chap. 2. How bishoppe John cured a dumme man, with blessing him.

+ + + " And when one weeke of Lent was past, the next Sounday he willed the poore man to come into him: when he was come, he bydd him put out his tounge and shew it unto him, and taking him by the chinne, made the signe of the holy crosse uppon his tounge, and when he had so signed and blessed it, he commanded him to plucke it in againe, and speake saying, speake me one word, say gea, gea, which in the english tounge is a worde of affirmation and consent in such signification as yea, yea. Incontinent the stringes of his tounge were loosed, and he said that which he was commanded to say. The bishopp added certaine letters by name, and bid him say A: he said A. Say B; he said B. and when he had said and recited after the bishoppe the whole crosse rewe, he put unto him sillables and hole words to be pronounced. Unto which when he answered in all pointes orderly, he commanded him to speake longe sentences, and so he did; and ceased not all that day and night following, so longe as he could hold up his head from sleepe (as they make report that were present) to speake and declare

his secret thoughtes and purposes, which before that day he could never utter to any man."

+ + + + + — & & &c.

.·. It must be remembered that the original of this was in Latin, and that "the english tounge" was anglo-Saxon.

Bulwer – John – Chirologia, London, 1644. (See Deaf & Dumb)

Earliest mention of manual alphabet made by any English writer with the exception of Bede.

Chirologia – p. 103.

"A pregnant example, of the officious nature of the touch, in supplying the defect or temporall incapacity of other senses, we have in one Master Babington, of Burntwood, in the county of Essex, an ingenious gentleman, who, through some sicknesse, becoming deaf, doth, notwithstanding, feele words, and, as if he had an eye in his finger, sees signes in the dark; whose wife discourseth very perfectly with him by a strange way of arthrologie, or alphabet contrived on the joints of his fingers; who, taking him by the hand in the night, can so discourse with him very exactly; for he feeling the joynts which she toucheth for letters, by them collected into words, very readily conceives what she would suggest to him"

Bulwer John. Philocophus: or, the Deafe and Dumbe Man's friend. Exhibiting the Philosophicall verity of that subtile Art, which may enable one with an <u>observant Eie</u>, to <u>Heare</u> what any man speaks by the moving of his lips. Upon the same Ground, with the advantage of an Historicall Exemplification apparently proving, that a Man borne Deafe and Dumbe, may be taught to <u>Heare</u> the sound of <u>words</u> with his <u>Eie</u>, and thence learn to speak with his tongue. By (I. B.) sirnamed the <u>Chirosopher</u>. — <u>Sic canimus Surdis</u>."

Bulwer was not an actual instructor of deaf-mutes, but he was the earliest English writer on the subject; and he has the credit of having first, before any other individual, distinctly proposed pantomimic signs as a means of teaching language.

Blind + Deaf. 1. James Mitchell — (born so) (see Deaf + Dumb — Stewart (Dugald))

2. Hannah Lamb — (born so) — Gentleman's Magazine Nov. 1808 Obituary Notice — burned to death at ~~nine~~ 9 yrs. of age.

3. Anna Temmermans (born blind — deaf in infancy), American Annals of D. + D. Oct. 1848. p. 12 — (see also Anna Temmermans)

4. Julia Brace lost sight and hearing at 4 yrs + 5 mths old. American Annals Jan 1849.

5. Laura Bridgeman

6. James Edward Meystre see Report of 2d Convent. of Amer. Teach. of the Deaf + Dumb p. 169.

Buchner (Andrew Elias). (see Deaf & Dumb No 32)

Author was a professor in Univ. at Halle, where origin. work pub. in 1759. The knowledge we have of it is derived from notices in later works, and particularly, an abstract given in "Essay on the Deaf & Dumb" by Dr Curtis. It treats 'historically' the different means employed to supply a partial or total want of hearing.

1st When auditory nerve exists — person can hear conversation by means of a thin slip of wood resting against ~~upon~~ the upper teeth of the speaker & listener.

2d. A case is cited from the Breslaw Essays, of a man who was made ~~deaf~~ so deaf by disease that he could not hear a cannon — and yet could follow a discourse in church by resting one end of a piece of wood against the pulpit — (which forms a sounding board) and holding the other end between his teeth.

Budding of Animals.

A Medusa has been observed to bud off young within the cavity of the stomach, and these, when developed, have taken on a form which is totally unlike the parent; which belongs, indeed, to the Medusa of another and very different family.

(Rev. Thos. Hincks) Popular Science Review.

Oct. 1872 — page 346

Boiling Springs – "Several aquatic insects insensible to the temperature are met with equally among boiling springs and in the frozen plains of the Polar Sea"
Jules Verne's Journey to the Moon
Chapter 19 Speech of Michael Arden

~~Bleeding to~~

Bleeding to death. ⟶

A singular story is told by a Millbridge physician of Rufus Mitchell, aged thirty, who recently bled to death from a slight cut: "He was one of those unfortunate men who bleed from the smallest scratch of the skin, and many times he has lain and bled till it seemed that the blood had all run out, and then he would gradually recover. This time the cut was quite large, and he lived but a few hours. There is something remarkable about this family, who are here termed as belonging to the bleeding family. None but the males bleed, and they are the sons of the females of the same family. For instance, this man has left children; none of them will bleed, but if the girls should have boys in their families, they will be of the bleeding kind, but the boys are themselve free and their families will be the same. I cannot explain this. I have practised in the family for more than twenty years. During this time a number of them have died from this cause, and others have bled, often dangerously."

216,000 CIRCULATION.

The Circulation of the Daily and Weekly Sun

Exceeds Two Hundred and Sixteen Thousand.

vertisements in both Editions, reaching more than One Million souls, only 90 Cents a Line.

THE NEW WEST.

verything in the shape of Goods, Wares, Merchan-, and Machinery is wanted in the New West, hence is the time to bid for its great cash trade.—*Rocky untain Herald.*

ract from Denver, Col., Board of Trade Report, 1874:

Six railway lines connect Denver with the golden ritories and the frontier States, making it the 'com-cial centre' of an empire of trade, radiating five dred miles without a rival."

"The nine banks of Denver sold thirty millions of hange in 1873."

"The trade and commerce of Denver alone exceeded teen million dollars last year."

the enormous importance of the great Empire of New West sufficiently appreciated?

he trade from

COLORADO,	UTAH,
NEVADA,	NEW MEXICO,
ARIZONA,	WYOMING,
MONTANA,	DAKOTA,
IDAHO,	WASHINGTON,
OREGON,	TEXAS, and

CALIFORNIA,

be secured by the best offers of strictly first-class ls at cash prices.

he goods must be first-class, because the freights are normous that it does not pay to carry there articles ferior value.

e trade is CASH, because money, GOLD and SILVER, e staple. The people all have money, they don't nd don't want credit.

reach these sections by commercial travellers a fortune and takes months and years of time. can be reached THROUGH THE NEWSPAPERS thoroughly in less than four weeks.

lifornia has thirty-six daily newspapers, Nevada n, Texas twenty, and in the other States and Terri-s named there are as many more. Of daily and kly publications they issue no fewer than five hun- and forty-nine newspapers, which may be found on t the American Newspaper Advertising Agency of P. Rowell & Co., 41 Park row, New York.

any merchant who desires to advertise as above, ten lists of the papers will be furnished, and nst each will be given the price at which any re-ed advertisement can be inserted in any required e, position, and time. A separate price given for and every paper, and the advertiser will accept exclude according to his judgment or wishes. In ases where strict justice will warrant, an editorial ce, calling attention to advertisements, can be se-d.

r estimates and information no charge is made. ertisements are taken at the publishers' cash rates, the publishers pay all charges for services. the papers advertised in can be seen, free of ge, either before or after making a contract.

GREAT AUCTION SALE OF

HOLSTEIN CATTLE,

Goshen, New York, Thursday, July 8, 1875, 11 A. M., p. The entire herd of John H. Comer. Trains from mbers st. ferry, N. Y., 7:30, 8:30, 9 o'clock A. M.

Shipping.

NCHOR LINE.—U. S. MAIL STEAMERS.

SAIL EVERY SATURDAY.

ssengers booked at lowest rates to or from any sea- or railroad station in Great Britain, Ireland, or the tinent.

HENDERSON BROTHERS, 7 Bowling Green.

MAN LINE—FIXED SOUTHERLY COURSE. Royal Mail steamers are appointed to sail as follows:

FOR QUEENSTOWN AND LIVERPOOL.

Y OF CHESTER......Saturday, July 10, at 11 A. M.
Y OF PARIS............Saturday, July 17, at 3 P. M.
Y OF BERLIN,.........Saturday, July 24, at 9 A. M.
Y OF RICHMOND......Saturday, July 31, at 3 P. M.
Y OF BRUSSELS....Saturday, August 7, at 9 A. M.

ABIN PASSAGE, $80 and $100, gold.

TEERAGE—To and from Liverpool, Queenstown, donderry, Belfast, or Glasgow, $28, currency.

abin and general office, 15 Broadway.

eerage offices, 33 Broadway, and Pier 45, North river.

JOHN G. DALE, Agent.

ATIONAL LINE. From Piers 44 and 47, N. R.

FOR LONDON DIRECT.

DENMARK, Thursday, July 8, 9:30 A. M.

FOR QUEENSTOWN AND LIVERPOOL.

EEN....July 10, 10 A. M. | ERIN......July 24, 9 A. M.
AIN......July 17, 3 P. M. |

abin passage, $70 and $80, currency. Steerage at atly reduced prices. Return tickets at reduced rates. epaid steerage tickets from Liverpool at the lowest es. Apply at the company's office, 69 Broadway.

F. W. J. HURST, Manager.

NLY DIRECT LINE TO FRANCE. The General Transatlantic Company's steamers for vre sail on Saturdays. Excursion tickets at reduced es. GEORGE MACKENZIE, Agent, 55 Broadway.

ACIFIC MAIL STEAMSHIP LINE

FOR CALIFORNIA, JAPAN, AND CHINA,

iling from Pier 42, North river.

FOR ASPINWALL, COLON, July 15,

necting for all Central American and Pacific ports.

OM SAN FRANCISCO FOR JAPAN AND CHINA.

GREAT REPUBLIC..................August 1.

or freight or passage, apply at Pier 42, North river.

H. J. BULLAY, Superintendent.

HITE STAR LINE.

UNITED STATES MAIL.

THE FASTEST LINE AFLOAT BETWEEN NEW YORK AND LIVERPOOL.

Calling at Cork Harbor both ways.

iling every Thursday from Liverpool, and every urday from White Star Wharf, Pier 52, North river.

RMANIC..............................July 10, 10:30 A. M.
RIATIC.......................................July 17, 4 P. M.
LTIC.................................July 24, 9:30 A. M.
PUBLIC......................................July 31, 3 P. M.
ITANNIC...............................August 7, 9 A. M.

assenger accommodation is unrivalled. Saloon, $80 $100, gold; return tickets on favorable terms. erage, $28.

. B.—Passage tickets and drafts can be obtained at ite Star Wharf, foot of West 10th st.

R. J. CORTIS, Agent, 19 Broadway, New York.

Personal Notices.

GENTLEMAN about 5 feet 9 inches high, slender built, smooth face, dark pale complexion, clothed dark suit and white straw hat, left Inwood station lay night at 8 o'clock in a flat bottom, inside brown, ide white painted skiff (iron outside rigged), and not been heard of since. An accident is feared. beral reward will be paid to any person who can any information concerning him at C. L. SCHMIED-s, Inwood, or 364 West 57th st., or 114 2d av., New k.

OTHER PAPERS PLEASE COPY.

LL OFFICERS and soldiers wounded, however slightly, can obtain a pension through Dr. E. B. KSON, late Surgeon U. S. Navy, 4 New Chambers st.

FORMATION wanted of Annie Gallagher, from ounty Sligo, Ireland, by her brother, JOHN GALLA-ER, Western House, 96 Watts st.

House Furnishing.

URNITURE, CARPETS,

BEDDING,

AT O'FARRELL'S, 410 EIGHTH AV.,

Between 30th and 31st sts.

AYMENTS TAKEN WEEKLY OR MONTHLY.

At Tammany Hall,

ON

Tuesday, July 6th,

5 P. M.,

THE FIFTH SERIES ALLOTMENT

OF THE

INDUSTRIAL EXHIBITION CO.

WILL BE HELD.

$20 PREMIUM MORTGAGE BONDS

Everybody who feels an interest in the early completion of a **PALACE OF INDUSTRY** for the city of New York, is invited to be present.

THERE WILL BE CHOSEN at this **SERIES ALLOTMENT, TEN SERIES** of Bonds. Each series comprises **ONE HUNDRED BONDS.** This makes a total of **ONE THOUSAND BONDS** which will be drawn at this **SERIES ALLOTMENT.**

The Bonds thus drawn will be **RETIRED** two months later by another public drawing, when principal and premium will be allotted to the holders of those which are then drawn.

The **SERIES ALLOTMENT** of July 6 simply decides what Bonds are to be redeemed.

The **BOND-SERIES ALLOTMENT** of September 6 decides what each of the bonds chosen at the July allotment shall receive.

THE SAME SYSTEM of selecting Bonds for retirement is practised by the Chicago, Rock Island and Pacific Railroad Company, the Ohio and Mississippi, the Omaha Bridge Company, and many other of the best corporations.

THE BONDS first elected to be redeemed have advantages over all other bonds.

ALL BONDS participate in the Series Allotment until they are in their turn elected.

THE MOMENT a Bond has been drawn in a **SERIES ALLOTMENT,** it becomes worth a large premium, because it is known that in two months it participates in the Bond Premium Allotment and will be redeemed with its share of interest money for the full period of the Loan.

The Company will purchase any bonds that are elected in the July allotment, and pay One Hundred Dollars for each, provided the said Bonds shall have been purchased of the Industrial Exhibition Company, 12 East 17th st., John Ritchie, 1,238 Broadway, or A. Welles, 67 University place.

FOR THE PURPOSE of enabling all people to aid in this enterprise, the $20 Bonds have been divided into

QUARTER BONDS,

AT

Five Dollars Each.

No better investment has ever before been offered to the public: The amount of interest which is paid on the Bonds is small, but in addition to the interest there is the inducement of a participation in the allotments of premiums, which take place quarterly, until all the Bonds are redeemed, and by which allotment any Bond may secure one of the following premiums: $50, $100, $200, $500, $1,000, $3,000, $5,000, $10,000, $35,000, $100,000.

All moneys derived from the sale of Bonds will be used only to carry out the plans of the Company, and to erect in the city of New York a Temple of Industry which will surpass any other.

All who feel a pride in the city of New York should invest.

Circulars and full information can be had by personal application, or by letter, at the office of

THE INDUSTRIAL EXHIBITION CO.,

12 East 17th Street,

Or JOHN RITCHIE,

1,238 Broadway, under Grand Hotel,

Or A. WELLES,

67 University place,

Or MILLER & CO.,

918 Broadway.

Steamboats and Railroads.

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THE GREAT TRUNK LINE AND UNITED STATES MAIL ROUTE.

Trains leave New York, from foot of Desbrosses and Courtlandt sts., as follows:

Express for Harrisburg, Pittsburgh, the West and South, with Pullman Palace Cars attached, 9:30 A. M., 5 and 8:30 P. M. Sunday 5 and 8:30 P. M.

For Williamsport and Lock Haven (via Philadelphia and Erie R. R. Div., connecting at Philadelphia), 9:30 A. M. For Williamsport, Lock Haven, Corry, and Erie 8:30 P. M., connecting at Corry for Titusville, Petroleum Centre, and the Oil Regions.

For Baltimore, Washington, and the South, "Limited Washington Express" of Pullman Parlor Cars daily, except Sunday, 9:30 A. M.; arrive Washington 4:10 P. M. Regular at 8:40 A. M., 3 and 9 P. M. Sunday 9 P. M.

Express for Philadelphia, 7, 7:30, 8:40, 9:30 A. M., 12:30, 3, 4, 4:10, 4:50, 5, 7, 8:30, 9 P. M. and 12 night. Sunday 4:50, 5, 7, 8:30 and 9 P. M. Emigrant and second class, 7 P. M.

For Newark at 6, 6:30, 7, 7:40, 8, 9, 10, 11 A. M., 12 M., 1, 2, 2:30, 3:10, 3:40, 4:10, 4:30, 5, 5:20, 5:40, 6, 6:10, 6:30, 7, 7:30, 8:10, 10, 11:30 P. M., and 12 night. Sunday, 5:20, 7, and 8:10 P. M.

For Elizabeth, 6, 6:30, 7, 7:40, 8, 9, 10 A. M., 12 M., 1, 2, 2:30, 3:10, 3:40, 4:10, 4:30, 4:50, 5:20, 5:40, 6, 6:10, 6:30, 7, 7:30, 8:10, 10, 11:30 P. M., and 12 night. Sunday 5:20, 7, and 8:10 P. M.

For Rahway, 6, 6:30, 7, 7:40, 8, 10 A. M., 12 M., 1, 2, 2:30, 3:10, 3:40, 4:10, 4:30, 4:50, 5:20, 5:40, 6, 6:10, 6:30, 7, 8:10, 10 P. M., and 12 night. Sunday 5:20 and 7 P. M.

For Woodbridge, Perth Amboy, and South Amboy, 6 and 10 A. M., 2:30, 4:50, and 6 P. M.

For New Brunswick, 7 and 8 A. M., 12 M., 2, 3:10, 4:10, 5:20, 6:10, 7 P. M., and 12 night. Sunday 7 P. M.

For East Millstone, 12 noon, 3 and 5:20 P. M.

For Kingston and Rocky Hill, 8:40 A. M. and 4:10 P. M.

For Princeton, 7, 8:40 A. M., 12:30, 2, 4:10, and 7 P. M.

For Lambertville, 9:30 A. M., 2, 3, 4:10 and 5 P. M.

For Flemington, Phillipsburg, and Belvidere, 9:30 A. M., 2 and 3 P. M.

For Mercer and Somerset Branch, 3 P. M.

For Trenton, Bord... ...and Camden 7:30 and 9:30 A. M., 12:30, 2, 4, 5, and 7 P. M.

For Freehold, 7:30 A. M., 2, 3, and 4:10 P. M.

For Farmingdale and Squan, 7:30 A. M. and 2 P. M.

For Farmingdale on Saturday only, 7 P. M.

For Hightstown, Pemberton, and Camden, via Perth Amboy, 2:30 P. M.

For Hightstown and Pemberton, 6 A. M.

Trains arrive as follows: From Pittsburgh, 6:55 and 10:30 A. M. and 9:20 P. M. daily; 10:15 A. M. and 6:50 P. M. daily, except Monday. From Washington and Baltimore, 6:20 A. M., 4:15, 5:15, and 10:27 P. M. Sunday 6:20 A. M. and 10:27 P. M. From Philadelphia, 5:10, 6:20, 6:55, 10:15, 11:20, 11:54 A. M., 2:15, 4:15, 5:15, 6:10, 6:50, 7:35, 8:44, 9:20, 10:27 P. M. Sunday 5:10, 6:20, 6:55, 11:54 A. M., 6:50, 9:20 and 10:27 P. M.

Ticket offices, 526 and 944 Broadway, 1 Astor House, and foot of Desbrosses and Courtlandt sts.; 4 Court st., Brooklyn; 114, 116, and 118 Hudson st., Hoboken. Emigrant ticket office, 8 Battery place.

FRANK THOMSON, General Manager,	D. M. BOYD, JR., Gen. Passenger Agent

A.—SPECIAL NOTICE.

CHANGE OF TIME TO 5 P. M.

On S... notic... for A... st., w... tions...

PEOPLE'S LINE

...ny, from Pier 41, North river, foot of Canal ...leave at 5 P. M. in order to make sure connec- Albany with the early morning trains for

SARATOGA SPRINGS,

...g there at 7 A. M.

arr... LBANY AND TROY BY DAYLIGHT.— DAY BOATS C. VIBBARD AND DANIEL DREW ...Vestry st., Pier 39, N. R., daily (Sundays excepted) ...35, and 24th st. at 9 A. M., landing at West Point, nwall, Newburgh, Poughkeepsie, Rhinebeck, Cats- and Hudson. TICKETS ON SALE FOR POINTS RTH AND WEST. Trip Tickets to West Point, nwall, and Newburgh, returning same day, $1. cial trains to and from Saratoga. To Saratoga, 0; round trip, $5.40.

OR WEST POINT, NEWBURGH, PO'KEEP-SIE, RONDOUT, KINGSTON COZZENS, CORN-LL, MILTON, NEW HAMBURG, AND (MARL-O' by ferry). THE MARY POWELL leaves Vestry Pier 39, N. R., daily, at 3:30 P. M.

OR RONDOUT, Kingston, Newburgh, High-land Falls (West Point), Cornwall, Marlborough on, Highland (New Paltz), Esopus. The steamboat mas Cornell, every Tuesday, Thursday and Saturday, ng Harrison st., Pier 34, N. R., at 4 P. M.

EWBURGH, CORNWALL, WEST POINT, COZZENS'S HOTEL DOCK, IONA AND. Daily (Sundays excepted) by steamboat MENIA, from BROOKLYN, Fulton st., at 8:30 A. M.; ry st., N. Y., 9:10; 24th st., 9:30, landing at Man-anville, 9:55; Yonkers, 10:35; Dobbs's Ferry, 11; ck and Tarrytown (by ferry boat), 11:25. Return-from Newburgh at 2:30 P. M., reaching New York 30, and Brooklyn at 7 P. M.

Musical Instruments.

GREAT OFFER.—We will for a few days dis-pose of one hundred pianos and organs of first-class kers, including Waters, at lower prices than ever ore offered. We invite the public to examine our k; instruments to let; monthly installments re-ed. HORACE WATERS & SONS, 481 Broadway.

HRISTIE'S PIANOS—Cheapest, best; cash or installments, at factory, 78 Barrow st., near Hudson.

50.—A PIANO, in perfect order; pianos to rent and on installments.

KRAKAUER, 352 Bowery.

Watches and Jewelry.

IAMONDS, watches, jewelry, and silverware bought and sold back when desired, at a very small nce. GEO. C. ALLEN, jeweller, 1,190 Broadway, 29th st.

ATCHES, clocks, and jewelry repaired by first-class workmen. GEO. C. ALLEN, 1,190 Br... near 29th st.

ELECTRIC WAVES UTILIZED.

THE WONDERFUL INVENTIONS OF MR. THOMAS A. EDISON.

Recording Three Thousand Words by Telegraph in One Minute—Transmitting Four Messages Over a Single Wire at the Same Time—Marvellous Mechanical Ingenuity.

For nearly ten years Mr. Thos. A. Edison of Newark, N. J., has applied himself to the invention of telegraphic systems and instruments. Last year he perfected what is known as the American automatic system, which is in use on the lines of the Atlantic and Pacific Telegraph Company. This system is based upon his discovery that the rapidity with which electric waves can be transmitted over telegraphic circuits is practically infinite and that telegrams can be transmitted at great speed if suitable apparatus can be devised to transmit, record, and overcome certain interfering phenomena which arose to reduce the rapidity.

A number of experiments upon the Atlantic cable had previously been made by the scientists connected with the United States Coast Survey in the determination of longitude, in the course of which it was found that the time which it took for a wave of electricity to travel from Valencia, Ireland, to Heart's Content, Newfoundland, was less than one one-hundredth of a second. This is not strictly the accurate time, as the passage of the electricity through the copper core of the cable acts inductively on the iron sheathing and water outside, and a secondary currant of electricity is set up, which reacting upon the primary current passing through the core of the cable neutralizes it for a time, and prevents the appearance of the signal at the distant end. It is admitted by experimental electricians that a message composed by the transmission of long and short waves of electricity through the cores of the Atlantic cable, from the battery at Valencia to Heart's Content, for example, returns through the earth to Valencia, and thus forms an electric circuit. If it was possible to discover a means by which the secondary currents set up by the passage of the primary signalling current through the Atlantic cable could be neutralized or accurately compensated for several thousand words a minute could be transmitted, and messages could be sent from New York to London for what they cost from New York to Philadelphia.

On land telegraphs the same phenomenon of secondary currents presents itself, but in an infinitely smaller degree, for in this case the suspended wire must act inductively through many feet of earth, and the strength of these currents increases in proportion to the close proximity of the earth and line.

ELECTRIC WRESTLING.

In 1871 Mr. Edison invented a system of compensation for these secondary currents, which although inapplicable to submarine cables, was successful upon land telegraphs. The principle is thus briefly told in his own words: "I found on trying to transmit waves from Washington to New York that the passage of the current over the wire set up a secondary current, which passed in a direction that mutilated the signals. It then occurred to me that if I could attach any device to the wire which also by the passage of the signalling wave would set up a secondary current passing in the opposite direction to the other secondary current, the two would balance or "wrestle" telegraphically with each other and leave the signals to come clear and sharp. Such a device was soon found. It consists of an iron ring, upon which is coiled a long fine insulated copper wire, a number of them being placed along the line at intervals of several miles, one end being connected to the wire and the other to the earth. A small part of the main current passing through the wire acts inductively on the iron rings, in the way that the current on the wire acts on the earth, but in the opposite direction, and the two neutralize each other.

On the wire between New York and Washington, 3,150 words have been transmitted and legibly recorded in one minute. The average word consists of five letters, and each letter of four waves, making it necessary to transmit sixty-three thousand waves in a minute, or a little over one thousand waves a second. The message to be transmitted is on a long strip of thin paper, about half an inch wide, in the centre of which, and running from end to end, are groups of holes. A large hole serves to transmit a long wave, or dash, and a small hole transmits a dot. This strip is prepared with great rapidity by an operator seated before a machine having a key board like that of a piano. After the paper is prepared it is taken to a machine connected with the wire. This machine is a simple metallic flanged wheel, turned by a crank, upon which the paper rolls, and is carried forward as the wheel revolves. This metallic drum is connected with the battery. Resting upon the paper in line with the row of holes is a lever, with a smaller roller at its end. This lever is connected with the telegraph wire. If the paper is passed rapidly through this machine, the intervention of the paper prevents the little roller from coming in contact with the drum underneath (paper being an insulator of electricity), but the moment a hole passes, the small roller comes in contact with the drum, and connects the battery with the line for a period of time proportionate to the size of the hole. With this arrangement almost any speed of transmission is mechanically practicable.

RECORDING 1,000 TIMES IN A SECOND.

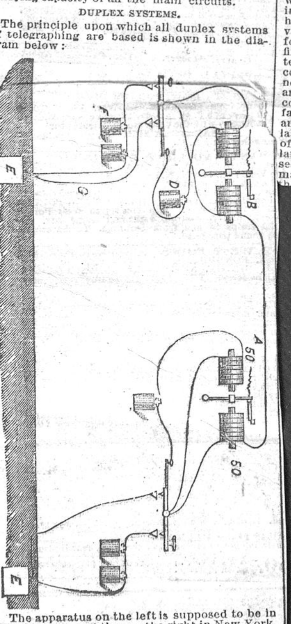
The most curious part is the method of recording the message at the distant station. A metallic drum driven by crank motion, similar to that in the transmitting machine, carries a continuous strip of paper moistened with a solution of Ferri cyanide of potassium. The drum is connected with the earth, and a small piece of iron wire connected with the telegraph line rests on the moistened paper. When a wave of electricity comes over the line it goes down the small iron wire resting on the prepared paper, and then through the paper to the wheel underneath and to the earth; the current resolves the water into its primary elements—oxygen and hydrogen—and the oxygen (which is in a peculiar state called nascent) instantly attacks the iron point, forming oxide of iron. This oxide instantly combines with the Ferri cyanide of potassium and forms Prussian blue—the basis of many writing inks. If the wave is short a small blue dot is formed, if long a long mark or dash is made, and the combination of the dots and dashes forms the letters of the Morse alphabet. The point of an iron wire is thus rusted and cleaned, and a new and colored compound formed 1,000 times in a second by a force 300 miles away.

The system for a long time received little encouragement from the telegraph managers. Gen. T. T. Eckert, formerly superintendent of the Western Union Telegraph Company, was the first prominent telegrapher who saw that it was to be the telegraph of the future.

Mr. Edison has been engaged for several years in endeavoring to increase the speed of Morse transmission by methods radically different from those of the automatic, and has accomplished practically what was for a long time considered impossible. More than twenty years ago Gintl, a German electrician, devised a plan for transmitting two messages over a single wire in opposite directions at the same time, and others since that time have tried the same thing, but no success was attained until Edison in 1865 and Stearns in 1869 brought out their systems. Mr. Stearns's system was purchased by the Western Union Telegraph Company in 1872, and was at once put in use on their lines, proving of immense value by doubling the carrying capacity of all the main circuits.

DUPLEX SYSTEMS.

The principle upon which all duplex systems of telegraphing are based is shown in the diagram below:

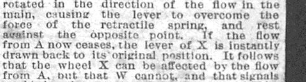


The apparatus on the left is supposed to be in Washington, and that on the right in New York. C is called by telegraphers a key, by which the current is thrown in and out of the circuit. The key lever is pivoted at the centre, and is provided with two teeth immediately over two contact wires. The one on the right is in connection with the earth by the wire G; the one on the left to the battery, F, the lever being connected with the line wire. Upon the extreme end of each key lever is a flat spring, which can be made to touch another contact point connected with a battery, D. When neither operator is transmitting, both key levers rest on the points connected with the earth, thus completing the circuit, but without any battery being included in it. The flat springs are also disconnected from their contact points, cutting off the local battery from the balancing magnets at each station. The spiral adjusting springs, when the battery is thus disconnected, draw the lever carrying the iron bar away from the limiting screw on the right of the magnets between which it is placed. Both stations are now ready to receive a message. We will suppose that the operator in Washington depresses his key, C. The lever to which the line is connected is separated from the point connected to the earth wire, G, and placed in contact with the battery, F, the current from which passes over the line, and through the magnets on the right in New York, thence to the earth through the key lever and earth wire. The cores of the magnets attract the iron piece connected with the lever, and are sufficient to overcome the power of the spiral springs, and the sound which it gives on striking the limiting screw conveys to the ears of the operator a "Morse" signal.

The current from the battery, F, in Washington, passes through the magnet, B, also, and its lever would be attracted were it not that at the moment when the attraction of the cores commences the current from the local battery, D, acts upon the wires of the opposite magnet and sets up a counter attraction, which exactly balances that from the main battery, on the same principle as placing two equal weights on the pans of a druggist's scale at the same instant—the beam showing no movement. By this second magnet and battery, D, the receiving instrument, B, remains unaffected by the signals sent from C. But the current going to the distant stations does not bring into action the local current and battery, hence the balancing effect does not take place, and the lever is attracted. Now, if the operator in New York transmits, he throws in the circuit another battery, which sends a current in the same direction as that of the battery in Washington. The effect of this battery upon the receiving instrument is neutralized or balanced in the same way as in Washington, but the extra current acts on the magnet, B, in Washington, and gives it a strength double that of the magnet on the opposite side of its lever; hence the lever is attracted by B, and the signal is made.

THE PRINCIPLE ILLUSTRATED.

This principle is illustrated by a system of water pipes and water, which is shown in the second diagram.



We suppose one part of the water telegraph, by which the electric wave is illustrated, to be in Harlem, and the other end in Wall street. A is a reservoir containing a force pump, by which a constant stream of water may be forced into the pipe M P, at the same time throwing a like stream into S P 1. The water thus thrown into the systems of pipes is insufficient to fill them. B represents a similar reservoir and pump, which throws a stream into the secondary pipe S P 2, and another stream through the main M P in the same direction as the flow from A, the two streams thus forced into the main, filling it. W is a water wheel so situated as to be operated upon by the currents in either circuit. To this wheel is attached a lever, moving between two fixed points, and provided with a retractile spring to hold it against one of these points. X is another wheel, similar to W in all respects. By suitable mechanism a stream of water can be made to circulate quickly in the main and the two secondary circuits. If these two intermediate streams are made to flow from A into the main and secondary pipes, it is evident that that part of the water flowing within the main pipe will, by acting upon the leaves of the wheel W tend to rotate it in the direction of the flow, while that part going through the secondary will operate with equal force to rotate it in the opposite direction, thus causing it to remain motionless, there being an equal amount of power applied on each side. But this is not the case with the wheel X, as no water from A can pass into S P 2, no such balance is maintained by X, which is therefore rotated in the direction of the flow in the main, causing the lever to overcome the force of the retractile spring, and rest against the opposite point. If the flow from A now ceases, the lever of X is instantly drawn back to its original position. It follows that the wheel X can be affected by the flow from A, but that W cannot, and that signals could thus be received from the lever of X by the sound of its contact with the points. Water projected into the main pipe from B, which otherwise affects the wheel X, is balanced by an equal amount flowing into S P 2, and this flow from B, passing within the main, so increases the volume in it as to destroy the balance maintained upon the wheel W by the streams projected from A, and causes it to rotate with the stronger current. It is thus seen that the flow from A affects only the wheel X, and that from B the wheel W, by the balancing properties of the secondary pipes; and that the flow in the main circuit is in the same direction, whether projected by A or B, and that it is the increase and decrease of the volume of the current that permits simultaneous signals to be given, apparently in opposite directions. This apparatus is precisely similar to that of the duplex system, in the latter electricity being substituted for the water, and electro-magnets for the water wheels.

A WONDERFUL DISCOVERY.

Mr. Edison's crowning discovery was bringing to light the fact that by a peculiar manipulation of the electric currents four messages can be transmitted over a single wire in various directions at the same time. This apparatus was called by the inventor the Quadruplex. It is used by the Western Union Telegraph Company, and according to Mr. Orton's last report solves the most difficult problem presented to a telegraph manager—how to meet natural increase in business without a corresponding outlay for wires. For this invention the inventor was offered by that company twenty-five thousand dollars cash and a yearly royalty amounting to nearly twenty-two thousand dollars.

In transmitting four messages over a single wire at the same time, four receiving magnets are used—two at each end of the line. Two of these magnets are of the ordinary kind, and respond to currents of a certain strength, independent of the direction in which they flow. The other two respond only to a change in the direction of the currents independent of the strength. A magnet of each kind is put at New York and Washington, and both are so arranged with extra magnets that the transmission of a weak or strong battery current over the wire from New York to Washington through the magnets in New York has no effect upon them. But the current acts upon the ordinary magnets in Washington and a signal is transmitted; if the direction of the current is reversed in New York the other magnet in Washington responds, and another distinct signal is transmitted. While these two distinct signals are being sent to New York from Washington the latter may in the same way transmit two distinct signals from New York. The action of the currents in the line wire itself is complicated, yet no two currents pass each other in opposite directions at the same time, according to the inventor. Electricians differ, however, on this point, some holding that the currents go through the ground, and others saying that an indefinite number of currents can pass upon the same wire.

MR. EDISON'S WORKSHOP.

Mr. Edison is not yet thirty years old; but for the last six or eight years his name has been well known in the telegraphic world. His many inventions of both instruments and systems have done much to simplify, cheapen, and advance telegraphy. His factory in Newark is in a four-story brick building in Ward street. The first story containing the laboratory is a little telegraphic world. Scientific apparatus of every conceivable shape lies scattered about. Cabinets of rare chemicals and chemical apparatus and wires extending in every direction. In one corner is a telegraph instrument connecting the factory with New York and Washington. In another corner is a desk covered with books labelled "Experiments," "Chemicals," "Notices of the Press." The upper stories are filled with lathes, planers, and screw machines. In the second story Stock Exchange indicators are made, in the third automatic instruments, and the fourth is devoted to the manufacture of ex-

Circles

may be drawn of any size, from the 16th of an inch to two feet in diameter, by means of a strong pin, a strip of perforated card and a sharp pencil; as accurately as by expensive compasses.

Cement for Marble, parian, Plaster &c. Take seven parts of rosin with one of white wax and when melted, mix with them a little plaster of paris to strengthen: the parts to be united are to be warmed sufficiently to melt the composit
wh. is to be rubbed over the surfaces of the join, which is to be pressed very strongly together. Use as little cement as possible. Eng. Mech.

Cement transparent. Dissolve 75 parts of pure indian-rubber (unvulcd.) in 60 parts of chloroform and add 15 parts of mastic. E. Mech.

Cement for Metal. Mastic 10 grains, rectified spirits of wine 2 drachms. Add 2 ounces of strong isinglass glue made with brandy and 10 grains of true gum ammoniac. Melt together and keep in a stoppered phial, which place in warm water before use. E. Mech.

Cement for Stone and Iron.—M. Pollack, of Bautzen, Saxony, states that, for a period of several years, he has used, as a cement to fasten stone to stone and iron to iron, a paste made of pure oxide of lead, litharge, and glycerine, in a concentrated state. This mixture hardens rapidly, is insoluble in acids (unless quite concentrated), and is not affected by heat. M. Pollack has used it to fasten the different portions of a fly-wheel with great success, while, when placed between stones, and once hardened, it is easier to break the stone than the joint.

[404.]—CEMENT FOR GLASS.—The best cement for glass is Canada balsam (applied hot).—F. S.

Apparent paradox

When a circle revolves round the inner circum-ference of another, twice its diameter, any point in the circumference of the smaller circle describes the diameter of the larger.

Consumption – A cure for.

Administer daily for twenty days, six milligrammes (six thousandths of a grain) of arseniate of soda. Then stop for forty days, and during that time give Cod-liver-oil and Peruvian bark. Repeat the treatment until a cure is effected. This remedy is almost infallible for preventing and stopping "spitting of blood."

(Revue Thérapeutique)

[318.] – ABBREVIATIONS IN CHEMICAL WORKS.—The following abbreviations are used in chemical works for simple bodies:—

Ag. Silver (*argentum*)	Mo. Molybdenum
Al. Aluminium	Na. Sodium
Ar. Arsenic	Ni. Nickel
Au. Gold (*aurum*)	No. Niobium
Az. Azote (nitrogen)	Nr. Norium
B. Bromine	O. Oxygen
Ba. Barium	Os. Osmium
Bi. Bismuth	Pb. Lead (*plumbum*)
Bo. Boron	Pd. Palladium
C. Carbon	Pe. Pelopium
Ca. Calcium	Ph. Phosphorus
Cd. Cadmium	Pt. Platinum
Ce. Cerium	Rh. Rhodium
Cl. Chlorine	Ru. Ruthenium
Co. Cobalt	S. Sulphur
Cr. Chromium	Sb. Antimony
Cu. Copper (*cuprum*)	Se. Selenium
Di. Didymium	Si. Silicon
Er. Erbium	Sn. Tin (*stannum*)
Fe. Iron (*ferrum*)	St. Strontium
Fl. Fluorine	Ta. Tantalum
Gl. Glucinum	Te. Tellurium
H. Hydrogen	Th. Thorium
Hg. Mercury	Ti. Titanium
I. Iodine	Tr. Terbium
Ir. Iridium	U. Uranium
K. Potassium	Va. Vanadium
La. Lanthanium	W. Tungsten
Li. Lithium	Y. Yttrium
Mg. Magnesium	Zn. Zinc
Mn. Manganese	Zr. Zyrconium

I HAVE not met with this French Charade before:

Mon premier est ce que vous m'êtes,
Mon second est ce que je voudrais que je vous fusse,
Mon tout est ce que vous devriez faire.

Answer.—Chercher.

[321.]—GALVANIC COIL.—"A New Subscriber," in No. 236, wishes for instructions to make an induction coil. Prepare a paper tube about 6 inches long and ¾in. diameter, by winding it round a piece of wood, say a ruler of the above size, ordinary glue will suffice to hold it at the last fold, also the commencement; about four thicknesses is ample. Next let him procure two pieces of wood, ½in. thick, 3½in. circle, bore a hole in each large enough to admit the paper tube, the latter to be glued into the former—that will be his reel for winding on his wire, about ½lb of No. 18 cotton covered copper wire. One end of wire is passed through a small hole in one end of the reel from the inside, then commence winding till the other end is reached, then back again, so as to form two layers of wire, one over the other; the remaining end of wire is to be passed through a second hole in end of reel. Of course he will leave the ruler in till the coil is finished. If this is not done, the coil will be damaged by the force required to wind the wire round it. Now paste two layers of paper round the primary wire and proceed to wind on the secondary wire, which ought

How to divide the circumference of any

Circle

into any number of equal parts even or odd.

" Fery. Mem. (69)

There is no odd number but from which if a certain number be subtracted, there will remain an even number easy to divide.

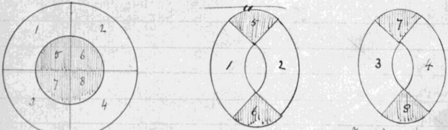
By the Rule of simple Proportion — As the given number of parts are to <u>360 degrees</u> (the whole circle) so are the parts subtracted to that arc (or part) of the circle which will just contain them.

Question. Divide a given circle into 69 equal parts. Subtract 9 and leave the easier number 60. Then

$$69 : 360^\circ :: 9 : 46\tfrac{9}{10}$$

Set off $46\frac{9}{10}$ degrees with your compasses in the periphery of the circle, and divide that portion of the circumference into 9 equal parts: and the rest of the circle into 60 equal parts, and the whole will be divided into <u>sixtynine</u> as was required.

To cut a circle so as to form two ovals without waste.



Fery. Mem. (69)

Comets shine by reflected light. Cosmos p. 97
Comets. Light of stars passes unimpaired through the nucleus. Cosmos p. 77
Clouds do not affect the zenith distances of the heavenly bodies. Cosmos p. 96.
Comets. Sudden lengthening & contraction of the tail — optical delusion caused by changes in the atmosphere. Cosmos p. 132
Clouds. Cirro-strati sometimes arrange themselves by day like rays of Aurora; and in such cases magnetic needle similarly affected. Cosmos p. 183
Crystals expand differently in different directions when heated. Discovered by M. Mitscherlich. Herschell's Nat. Phil. par. 266.
Composition of forces.
(a.) If two forces, P and Q, act concurrently upon a point at any angle θ, and if R be their resultant, — Then —

$$R^2 = P^2 + Q^2 + 2PQ\cos\theta$$

(b) To determine the direction of Resultant.

$$\sin R \hat{} P = \frac{Q \sin\theta}{R}$$

$$\sin R \hat{} Q = \frac{P \sin\theta}{R}$$

Chemical Affinity - Hypothesis concerning —

In a criticism of Herbert Spencer's "Modern Philosophy and The Theory of Evolution" published by

The writer says: Motion &c "Instead of disappearing at once into space in the shape of radiant undulations of the interstellar medium they are detained within the star where they are converted into vibrations of the particles of matter; and according as the rhythms of the vibrations are synchronous or discordant or otherwise adjusted to each other the particles manifest what we call chemical affinity or not." (p. 350)

To dye woods.

Blue. Boil first in perchloride of iron; and then in ferro-cyanide of potassium.

Yellow. Iodide of potassium, — acetate of lead.

Green. Nitrate of copper; — Arseniate of potash;

Red. Iodide of potassium; bichloride of mercury

Purple. Perchloride of gold; protochloride of tin.

Black. Tincture of Galls; perchloride of iron.

DRAWING FOR THE MILLION.

SIR,—Let the reader look out of window, and taking a pencil or needle, endeavour to follow on the glass the outline of any large object outside. With both eyes open he will not succeed in doing so. Now let him *shut one eye*, and he will find if he keeps his hand steady that he can trace all the lines in perfect perspective upon the glass. The principle applied here is the converse of the principle of the stereoscope. This infallible method of delineating is practically used as follows: viz., arrange a small wooden frame, with a groove to hold the glass vertically, or pegs to support it horizontally. On the one side of the glass trace the lines of your object with a pencil of French chalk. These can be got at Winso and Newton's, or other artists' colourmen. Now take out and turn over the glass, and on the other side of it trace with a pen and printing ink, thinned with turps, the lines you made with the chalk. From your printing ink drawing you can take four or five impressions on paper. This method is specially useful for drawing flowers and small objects, over which the glass can be supported horizontally; also, as your clever readers will at once see, for reducing maps and drawings to any

Descartes, René otherwise René des Cartes.

His Principia published in 1644.

Work divided into four parts — 3rd & 4th parts contain his Theory of vortices.

See French edition "Les principes de la philosophie écrit en Latin par Descartes et traduits en Français par un de ses amis (Picot) 1724

D E F G H J K L M Mc N O P R S T U V W Y

DELSARTE'S SCIENCE OF DRAMATIC ART.

Mr. MacKaye, who is to lecture on this subject tomorrow evening, was considered by Delsarte as the most apt and gifted of all the long list of his pupils. Under the auspices of Delsarte, who predicted for him a career of unexampled brilliancy as an actor, Mr. MacKaye was to have made his début at the Theatre Français in the character of *Orestes*, Talma's greatest part. This would have been an event without a parallel in the whole history of that illustrious stage. The Franco-Prussian war broke up the arrangement, and Mr. MacKaye came home to America, where he will make his first appearance on the stage early next autumn. In the meantime he wishes to assist in making the Delsartean system of æsthetics known in this country, by lecturing on the subject here and in New York. We can speak confidently beforehand of the rare interest and instructiveness of the exposition he will give. From an extended article on Delsarte by a prominent Parisian writer we translate the following passage:—

"As an orator Delsarte has had at his lectures on æsthetics, enthusiastic audiences of academicians, literary men, artists, savants, politicians and fashionable women. As a singer and reader he has moved the most skeptical of assemblies to tears. He made Spontini and the great Spanish Catholic, Donaso Cortès, tremble and weep with emotion. At his concerts ladies of the highest aristocracy have sung with him or accompanied him with the piano. As a teacher his pupils are princes, princesses, amateurs from the highest circles. The prima donnas, Barbot and Carvalho owe to him their chief power. He has received many medals and decorations for his valuable discoveries and inventions. As a member of our principal musical society and president of its examining committee, he has always been on the side of science and justice as allied against prejudice and ignorance.

"The day will come when I shall more fully portray this man, who, in literary and artistic assemblies, festivals of heart and mind, has revived Gluck, Bassnet, La Fontaine and Paul Louis. Today I can only thank Delsarte for granting to the journalist, whom necessity forces to go his weary rounds from parlor to theatre, a brief forgetfulness of the *convulsionnaires* of literature and music in the contemplation of his truth, his genius and faith."

The following list is taken from the American Annals of the Deaf & Dumb for Oct. 1847

Deaf & Dumb — Works ~~relating to~~ containing information concerning

1. Bede. The Historie of the Church of Englend &c (Abbe Bede)
("How Bishopp John cured a dumme man, with blessing him.") Transl. from the Latin into English by M. ~~S~~ Stapleton D.D. 1622 (Book V. Chap 2.)

2. Beda. De Loquela per gestum digitorum, libellus.
("Of Speaking by the motion of the fingers — a little book")
A Work — believed to be the same as this — but under a different title, printed at Ratisbon in 1532, is in the library of the New York Institution for the Deaf & Dumb.

3 Bulwer John Chirologia; or, the Naturall Language of the Hand &c whereunto is added Chironomia; or the Art of Manuall Rhetoricke: &c London 1644
(see Bulwer)

4 Bulwer John Philocophus: or, the Deafe and Dumbe Man's friend. London 1648.

5. Digby (Sir Kenelm) Treatise on the Nature of Bodies.
First pub. in 1646

In ch. 28 is related the case of a pupil of Bonet, in Spain, of whose ability to speak & read the lips the author was a witness. He refers the reader to the work of Bonet on the subject, in Spanish.

6. Wallis (John). Grammatica Linguae Anglicanae. Cui praefigitur, De Loquela; sive, de sonorum omnium loquelarium formatione: tractatus grammatico-physicus. Oxford, 1653
(Sixth Edition — London 1765)

The treatise De Loquela is most valuable.

Deaf & Dumb – Works relating to –

7. Wallis (John) Letter to the Hon. Robert Boyle, dated March, 1662. Pub. in the Philos. Trans. of the Royal Society for July, 1670.

This letter contains very just views on the education of the Deaf & Dumb.

8. Philosophical Trans. for January, 1668, p. 602.

Containing an account of the natural alphabet of Van Helmont, a Hollander, which was claimed to supply a method for the instruction of the D. & D. (See Visible Speech)

9. Holder (Wm) Philosophical Trans. for 1668.
(Vol. I. p. 243, of Hutton's Abridgement.)

10. Holder (Wm) Elements of Speech etc, with an Appendix concerning persons Deaf and Dumb. London 1669.
(See Holder – Wm)

11. Sibscota (Geo) Deaf & Dumb man's discourse, or concerning those, who are born Deaf & Dumb, etc.
London 1670.

12. Holder (Wm) A supplement to the Philosoph. Trans. of July, 1670. Some reflections on Dr. Wallis his Lettre there inserted. London 1678.

13. Wallis (J) A Defence of the Royal Society and the Philosophical Transactions, particularly those for July 1670, in answer to the cavils of Dr. W. Holder, by way of Letter to Wm. Lord Viscount Brouncker.
London 1678.

14. Dalgarno, (George) Didascalocophus, or the Deaf and Dumb man's Tutor. Oxford 1680.
A most valuable work. A copy is extant in the Library of the American Asylum, Hartford.
Concerning another work by G. D. entitled "Ars Signorum" see "Universal Language".

15. Foot (–) Translation in English of Amman's Surdus Loquens. London 1694.

16. Wallis (John) Letter to Thomas Beverly, dated Sept. 30th 1698. Pub. in the Philos. Trans for Oct. 1698.
This is a concise explanation and outline of a method of instructing deaf-mutes to the use and the understanding of language, by writing and a manual alphabet, without the aid of speech. A Latin version of this letter was pub. in Wallisii Opera Mathematica (Vol III Letter No. 29.) and also appended to the sixth edition of the Gram. Ling. Angl. It was inserted in both English and Latin, in the work, by an American author (Francis Green) entitled "Vox Oculis Subjecta" 1783

17. Wallis (John) Letter addressed to J. C. Amman, and published by him in his Dissertatio de Loquela Amsterdam – 1700

18. Martin (–) Philos. Trans. for 1707 – (Vol V p. 379 of Hutton's Abridgment).
This paper reports the restoration of a deaf-mute to hearing

Deaf + Dumb. Works relating to ——

19 Waller (Richard) Philos. Trans. for 1707.
An account of a man + his sister, who had lost hearing in childhood, able to read lips well, and speak intelligibly.

(From American Annals for April 1848)

20 Burnet (Gilbert, Bp.) Travels through France, Italy, Germany etc.
This work consists of five letters – the 4th dated Rome, Dec. 8th 1685 – contains an account of d. + d. girl at Geneva – who could understand what her sister said in the dark by "laying her hand on her mouth".

21 Monboddo (Lord) The Origin and Progress of Language. 1773 — Vol. I pp. 177, 8, 9; 181, 2, 3, 4
Refers to the methods of l'Abbé de l'Epée and Mr. Braidwood; and alludes to several wild men found without the faculty of speech. (see Wild Men)

22 Herries (John) Elements of Speech – 1773.

23 Arnot's History of Edinburgh p. 425
Passage quoted in Vox Oculis Subjecta (1783) no mention of date.

24 "Vox Oculis Subjecta" A Dissertation on the most curious and important Art of Imparting Speech, and the Knowledge of Language, to the naturally Deaf, and (consequently) Dumb; with a particular Account of the Academy of Messrs Braidwood of Edinburgh, and a Proposal

to perpetuate and extend the benefits thereof. By a Parent. London 1783. 12mo.; pp. 224.
This work, written by Francis Green, contains many extracts from preceding authors.

25. Thornton (William) Cadmus, or a Treatise on the Elements of Written Language. &c &c.
Trans. of Amer. Philos. Soc. Vol. III. Philadelphia, 1793

26. Watson (Joseph LL.D.) Instruction of the Deaf and Dumb. London 1809 12mo. pp. 139.

27. Dutens (Rev. —) The Christian Observer, London, Vol VIII pp. 432-3-4-5 — No for July 1809
On the Capacity of the Deaf & Dumb.
An interesting article concerning the education of a deaf & dumb young lady (Miss Wyche).

28. Abbé de l'Epée. Translation of "The Method of Educating the Deaf and Dumb, confirmed by long experience" London 1801 pp. 228 12mo.
The translator & Editor unknown. Work dedicated to Lord Chancellor Eldon.

29. Stewart (Dugald) Elements of the Philosophy of the Human Mind — Appendix to Part III Chap. II.
Some account of James Mitchell, a boy born Deaf & Blind. (See Blind & Deaf)

30. Wardrop (James) — History of James Mitchell — London 1813

31. Gordon (John) M.D. A Paper concerning Mitchell
Trans. of Royal Society of Edinb. Vol VIII Part First p. 129.

Works containing Information concerning the Deaf & Dumb.

32 Buchner (Andrew Elias) An Easy and very Practical Method to enable Deaf Persons to Hear. Translated from the German. London, 1770.
(see Buchner)

33. Reports of Old Kent Road Instit. London. formerly at Bermondsey. First appeared 1822 or earlier.

34. Reports of Edinburgh Institution for D. & D. estab. 1810.

35. Rees' Cyclopedia Articles "Ear" – "Deafness" – "Dumbness"

~~35~~ 36. Gordon (Dr. John) Edinburgh Encyclopedia. See Article "Dumb and Deaf"
"Interesting and valuable" says the Americ. Annals.

37. Roget (Peter M.) M.D.; F.R.S. Encyclopedia Brittanica. Article "Deaf & Dumb;" Supplement, 1819 & subs. edit.
Americ. Annals speaks disparagingly of this article.

38. Reports of Inst. for D. & D. at Edgbaston, near Birmingham
Change of plan of Instruct. recommend in Report for 1826 pp. 101, 102, 103.

39. Arrowsmith (John P). The Art of Instructing The Infant deaf and dumb &c. London 1819

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40. The Mastery of Languages; or, the Art of Speaking Foreign Tongues Idiomatically. by Thomas Prendergast, London: Richard Bentley 1864

41. The Study of Languages brought back to its True Principles, or, The Art of Thinking in a Foreign Language. By C. Marcel, Knt. Leg. Hon. &
New York. D. Appleton & Co., 1869.
(90 Grand St)

Deafness – Recovery of hearing by a deaf-mute.
A girl Hannah C. Fletcher – who was born deaf & dumb – heard sounds at seven yrs of age after a long spell of typhoid fever (1854) and began to speak words. Since then, her hearing and speech have been gradually improving.
The letter descriptive of this case ~~Ed~~ (written by the physician who attended ~~the~~ the girl) is published in the American Annals for Jan. 1858. The letter is dated "Verdiersville, Orange Co., Va., Dec. 24, 1857"
It is signed "V. Quesenberry, Jr. M.D."
Dr. Q. states that he merely treated her for typhoid fever – and cannot explain the phenomenon.
Deaf & Dumb. A list of text-books for the D. & D. is given in the Annals for October 1869

Deafness – Tests of – Oscar Wolfe
Sprache und Ohr

Deaf-Mutes are said to suffer more when sick, from noises than hearing-people do — That is, of course, they suffer from the vibrations. Miss L. C. Weddell.

Deaf-mute — Recovery of hearing by a —

Miss McGann of the Ontario Instit. reports a case of the recovery of hearing by a deaf-mute at the age of 15 or 16 — followed by the recovery of speech. The girl's name Janet Johnson — Hamilton, Ontario. Educated abroad.

Elydoric Painting. This is a method of painting invented by M. Vincent of Mont Petit, in wh. the pigments are mixed with an emulsion of oil and water. It is said to add the fresh appearance of water-colours, and the finish of miniature-painting to the mellowness of oil-colours.

Elasticity — Striking Example of

Work up a piece of bread in the fingers into a mass somewhat resembling putty. Let it be formed into any shape. It will be found impossible, owing to the elasticity of the substance, to alter its form by throwing it against any object — e.g. a wall or a door.

Earthquakes regarded in Intertropical America as the harbingers of abundant rain. Cosmos p. 201.

Electricity developed by the evaporation of sea-water. Somerville's Physical Geography p. 90

Electricity in Clouds.

Grey clouds — negative

Red – White & Orange — positive.

Somerville's Physical Geography p. 90

Electricity is developed (in the human body) by rubbing the feet on a new Brussels carpet.

By shuffling along for a few moments a spark can be drawn from the finger

sufficient to light the gas.
communicated by P. L. Richards
35 W. Newton St. Boston. Mass.

Electricity — developed in the human body.
1st W. R. — stood upon a chair while I rubbed his back with a ~~woolen~~ flannel cloth. On touching the gas burner — a spark came from W. R.'s finger that ignited the gas.
2d. The same experiment was successfully ~~conducted~~ executed, when W. R. — rubbed himself with the flannel cloth.

January 1873.

Electric telegraph. Telegraphing across the Atlantic ~~with neither~~ without a wire and without a battery. See telegraph.

Electro — Magnetism. Prof. Henry and P. Ten Eyck, of the Albany Academy, discovered many years ago that 540 feet of wire, used as a continuous coil would cause a U magnet to sustain a weight of 145 lbs.; while the same wire cut into nine equal pieces, and each piece wound on a separate part of the magnet, and the projecting ends properly soldered to the copper and zinc cylinders of the single

cell, would cause the same bar to sustain 750 lbs. In a subsequent experiment 20 pieces of wire, each 31 feet long, were wound on a bar, as in the first ~~place~~ case, and the ends attached to a copper and zinc battery of five square feet surface. This electro-magnet supported 2,063 lbs.

These experiments show a simple method by which the limit mentioned above may be evaded, and the same battery and iron bar be made to exert a vastly greater magnetic force with the same number of turns.

They also show how a vastly longer wire, and a vastly greater number of turns in the aggregate, can be used effectively with the same U bar, and the same battery. We are not aware that any practical use is made of this principle, in either American or European telegraphy. Might it not be employed successfully to diminish the size of the batteries employed, and also the necessity for relays?

"Wonders of Electricity" (transl. fr. French of J. Baile) Edited by Dr. John W. Armstrong; Scribner & Co. New York 1872. Foot note to page 27

Electricity — (Static). "Sir William Thompson has preserved charges of electricity for years in bulbs hermetically sealed." "Electricity + Magnetism" by Clerk Maxwell p. 49.

Electrical Discharges through rare gases. Colour of light. In some cases a regular alternation of luminous and dark strata. In a tube described by Mr Gassiot (Intel. Observer, March /66), the light of each of the disks is bluish on the negative and reddish on the positive side and bright red in the central stratum. (Clerk Maxwell, "Elect. & Magn." p. 56)

Electricity. Experiment for the future. Production of continuous current of electricity from permanent magnet. A permanent magnet suspended in a particular way will revolve around a wire through which a current of electricity is passing (Sir Snow Harris)
Query — Will not the converse of this be true? If the magnet — suspended as before — be made mechanically to revolve round the wire — will it not induce in the wire a continuous current of electricity?

AGB July 1875

Electricity — Experiment for the future. Current of electricity passed through a permanent magnet from the centre to the poles will cause it to revolve — Will not the mechanical revolution of the permanent magnet occasion a continuous current of electricity in wires connected with the centre + poles?

AGB April 1876

For this division of the bobbin I am indebted to a suggestion from Dr Strethill Wright, whose contributions to this department of science have more than once been acknowledged by the Society to be both valuable and original. The great difficulty in this construction lies in keeping the spark from travelling through or over the disc. It was only by thickening the disc, and enlarging its diameter beyond the coil, that proper insulation was secured.

With eight Bunsen cells the coil gives sparks of from $6\frac{1}{2}$ to 7 inches in length. The aureole can be distinctly seen in sparks 4 inches in length. Both the tension and quantity are thus, considering the length of the secondary wire, highly satisfactory.

In concluding, allow me to express my obligations to Mr Hart, who has laboured most enthusiastically to bring the construction of the coil to a successful issue. Whatever be your opinion of my plans as "architect" of the coil, I am sure you will not have two opinions as to his merits as "builder."

On a New Current-Interruptor for the Induction Coil. By Robert M. Ferguson, Ph.D.*

It is a well-known fact in the science of electricity, that when a spiral of very fine wire is made to dip at its lower end into a cup of mercury so as thereby to complete a galvanic circuit, the spiral coils up and shortens. If the end of the spiral be made to dip very little, the shortening of the spiral will lift the end out of the mercury and open the circuit. The weight of the spiral brings the end down again so that it again dips. The action of the current once more draws it out, and thus an alternate coiling and uncoiling of the spiral keeps up a continuous interruption of the circuit. It struck me that this action, which had hitherto only be used as an illustration of the principle that currents in the same direction attract each other, might be usefully

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* Read before the Society and Current-Interruptor exhibited in action, 9th April 1866.

Electricity and Light. "The mere presence, possibly the mere pressure of light will so far alter the constitution of a substance like selenium as to turn it from a poor conductor of electricity into a very decent one."

Article entitled "The hurricane of this week" in Spectator for March 18th 1876.

TWISTING A BAR OF IRON BY ELECTRICITY.—The remarkable phenomenon, said to have been first observed by Professor Gore, which consists in the very perceptible twisting of a bar of iron by the joint effects of currents of electricity passing longitudinally through and also round such a bar, by means of the insulated wire of an enveloping helix, has been further investigated. Subsequent experiments ha✓ shown that such twisting may be made to reach fully one quarter of a revolution. It has also been ascertained that both currents are necessary to the development of the phenomena. Either current, when applied separately, simply produces the effects of magnetizing the bar. The direction of the twist is definitely related to the direction of the current in the helix. In order to produce the fullest effect, the currents must be simultaneous; when they are successive, a perceptible twist results in a lesser degree.

[330.]—BLUE AND GREEN COLOURS IN FIREWORKS.—To make a rich blue fire suitable for rocket stars, take 6 parts by weight of burnt alum, 6 carbonate of copper, 8 sulphur, and 30 chlorate of potash. A good green may be prepared thus:—Nitrate of barytes, 62½ parts; sulphur, 10½; chlorate of potash, 23½; orpiment, 1½; and charcoal, 1½; suitable for stars or hand fire.—A SMALLBRIDGER.

RENDERING CALICO FIRE PROOF (G. B. A.).—Cotton cloth may be rendered nearly fireproof by steeping it in a solution of alum and letting it dry. A better process is to starch it with starch mixed with phosphate of ammonia, a little more by weight of the salt than of the starch. Grind the dry starch and the salt together in a mortar, and then prepare the starch with the mixture in the usual way. After starching the cloth with this preparation, it should be rolled up in a dry cloth, and allowed to remain till nearly dry, and then ironed, using a little white wax to prevent the sticking of the iron.

Frequency of the English Elements of Speech.

Investigation concerning the relative frequency of the English Elements of Speech made by the members of the Senior Class for Articulation Teachers Spring of 1876.

	Consonants							Total
	1	2	3	4	5	6	7	
	6	17	12	14	17	15	29	110
	7	20	7	9	15	7	13	78
	18	37	13	29	17	17	29	160
	24	63	19	56	54	54	60	330
	26	48	18	43	50	39	54	278
	25	66	32	56	62	54	58	353
	8	29	10	14	12	26	24	123
	4	5	3	8	8	5	3	36
	3	18	8	9	9	12	8	67
	6	20	7	15	11	10	27	96
	12	11	8	17	17	23	14	102
	—	5	—	5	—	3	7	20
	24	30	13	24	19	28	39	197
	3	4	—	2	4	5	2	20
	7	20	23	16	41	21	21	149
	—	6	1	1	5	4	4	21
	~~8~~	13	8	9	12	7	15	72

	1	2	3	4	5	6	7	Total
υ	2	8	4	5	4	—	9	32
ω	4	14	7	19	6	12	23	85
∩	–	–	–	–	–	3	4	7
⋒	1	17	—	16	10	2	5	51
℧	12	45	22	40	27	33	44	223
ෂ	17	24	11	12	18	30	28	140
Ω	3	10	7	7	7	16	22	72
ೞ	–	3	2	3	16	4	6	34
O	16	22	10	15	11	14	33	121
Ƴ	10	42	13	18	34	30	39	186

Gum-arabic solutions to preserve.
Add a few drops of Alcohol or any essential oil.

Gold-bronze Varnish for wood or pasteboard &c.
Mix iodinet of lead and various gums together. Use any gums you like, but select according as you wish the work to stand damp or washing or not; — those which are soluble or insoluble in water.
To make Iodide of Lead. Boil Iodide of Potassium with Acetate of Lead in water. The solution while warm is poured into a filter placed over a tall glass jar containing cold water. The iodide is deposited on cooling in brilliant scales of a golden colour and lustre.

Grammatical Symbols &c.
In the Annals for Oct. 1869 p. 201 — reference is made to "the study of grammar by means of the symbols of President Barnard, and the Charts of Professor Peet, or the symbols and diagrams of Professor Storrs" &c.

Grove — "According to the experiments of Mr Sullivan electricity may be produced by vibration alone if the substance vibrating be composed either of dissimilar metals, as a wire partly of iron and partly of brass caused to emit a musical sound; or of the same

metal, if its parts be not homogeneous, as a piece of iron, one portion of which is hard and crystallised and the other soft and fibrous; the current resulting appears to be due to the vibration, and not to heat engendered, as it ceases immediately with the vibration.

The Correlation of Physical Forces
Chapter on "Motion".

Gravity

That gravity should be innate inherent and essential to matter so that one body may act upon another at a distance through a vacuum without the mediation of anything else, by and through which their action and force may be conveyed from one to another, is to me so great an absurdity that I believe no man who has in philosophical matters a competent faculty of thinking can ever fall into it

Gravity must be caused by an agent acting constantly according to certain laws; but whether this agent be material or immaterial I have left to the consideration of my reader"

Sir Isaac Newtons third letter to Bentley.

Heat. Mechanical Equivalent 772 foot-pounds.
Co-efficient of Expansion ·00366.
Quantity of heat, (when the <u>volume</u> is constant) is to the quantity of heat, (when the <u>pressure</u> is constant) as 1 : 1·421
Absolute zero of heat —273° Cent.

Heat. According to the French Experimenter Regnault, the following numbers express the relative amounts of heat, given out by a unit of weight of each of the substances named in the table, in cooling from 98°C. to 15°C.

Al. 0·2143	St. 0·0508	As. 0·0814
Bi. 0·0304	B. 0·2352	Br. 0·1129
Cd. 0·0567	C. 0·2414	Co. 0·1067
Cu. 0·0952	Diamond 0·1469	Au. 0·0324
I. 0·0541	Ir. 0·0326	Fe. 0·1138
Pb. 0·0314	Li. 0·9408	Mg. 0·2499
Mn. 0·1217	Hg. 0·0333	Ni. 0·1086
Os. 0·0311	Pa. 0·0593	(solid) P 0·1887
(amorph.) P. 0·1700	Pl. 0·0329	Ka. 0·1696
Rd. 0·0580	Se. 0·0827	Si. 0·1774
Ag. 0·0570	Sd. 0·2934	(native) S. 0·1776
(recently melted) S. 0·2026	H. 0·0474	Th. 0·0336
Pt. 0·0562	Tu. 0·0334	H_2O (liq.) 1·9080
Zn 0·0955	~~Cd.~~	

Heat. Specific heats of some elastic fluids according to Regnault. Specific heat of $H_2O = 1$

Simple Gases

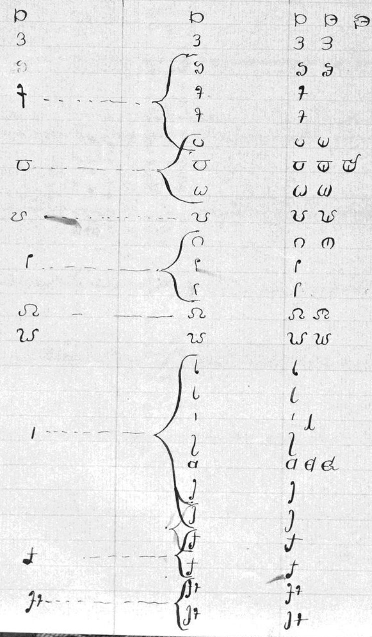
	Specific Heats	
	Equal weights	Equal volumes
Air	0.237	
Oxygen	0.218	0.240
Hydrogen	3.409	0.236
Nitrogen	0.244	0.237
Chlorine	0.121	0.296
Bromine	0.055	0.304
Compound Gases (without condensation)		
Nitric Oxide	0.232	0.241
Carbonic Oxide	0.245	0.237
Hydrochloric Acid	0.185	0.235
Compound Gases (3 vols. condensed to 2)		
Carbonic Acid	0.217	0.331
Nitrous Oxide	0.226	0.345
Water vapour	0.480	0.299
Sulphurous Acid	0.154	0.341
Sulph. of Hydrogen	0.243	0.286
Bisulph. of Carbon	0.157	0.412

Helmont - Van. Speculations concerning a natural alphabet (1667) - see "Visible Speech"

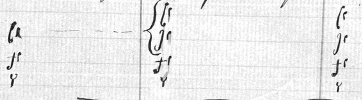
Holder - Wm. A passage from the "Elements of Speech" recommends the use of a manual alphabet, and suggests the plan of a grammar and a dictionary for the deaf and dumb; the latter to explain the names of visible objects, and other words, as far as practicable, by means of engraved figures.

Homophenous (ὅμως φαίνομαι) Elements — Table of.

Pseudo-homophenical Symbols.	Homophenical Symbols	Homophenous Elements

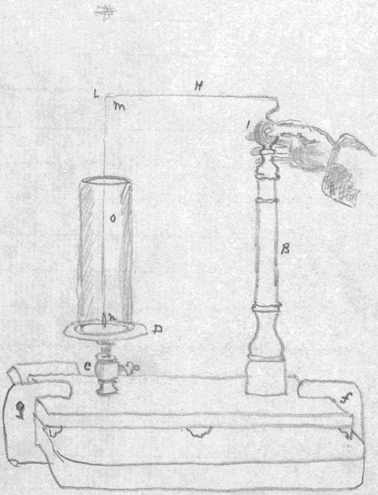


Pseudo-homophenical symbols Homophenical symbols Homophenous Elements



Notes upon homophenical peculiarities of speech.

1. When homophenical elements succeed one another they appear as one position prolonged
2. When pseudo homophenical elements succeed one another the differences are brought out markedly
3. ʊʋ is perfectly distinct ʋʊ = ʋ
4. ωʊ = ʊ generally. ʊω is perfectly distinct
5. o is always invisible.


L
H
m
I
o
B
n
D
c
g
f

Japanning Castings.—(J. H.). To japan castings, clean them well from the sand, then dip them in or paint them over with good boiled linseed oil. When moderately dry, heat them in an oven to such a temperature as will turn the oil black without burning. The stove should not be too hot at first, and the heat should be raised gradually to avoid blistering. The slower the change in the oil is effected the better will be the result. The castings, if smooth at first, will receive a fine black and polished surface by this method

[398.]—IVORY MELTING.—"Ivory" wants to dissolve ivory. I copy a receipt from "The Laboratory; or, School of Arts," published in 1740:—Take 1lb. of wood ashes, 2lb. of quicklime, 1 quart of water. Let it boil together to one-third, then dip a feather into it, if the plume comes off in drawing it out it is boiled enough, if not let it boil longer; when settled filter through a cloth, then put in shavings or filings of the horn, &c.; let them soak three days. Anoint your hands with oil, work the shavings into a paste, and mould or form into what shape you please.—Anthony Carr.

Joining Glass (L. Masters).—Direct the flame of the blowpipe on the spot where it is desired to form a join, and when red-hot, apply the end of a glass rod, also red-hot: next apply flame round the point of contact and gradually draw out the rod and the adhering glass, which will form a short tapering tube. Now break off the rod, and a piece of tube place carefully on the protruding nick and fix by heat. [37

Bleaching Ivory.—An improved method of bleaching ivory, especially for use in pianos, deserves record. The ivory, when cut into plates of the proper thickness for keys, is placed in a flat vessel, and a solution of carbonate of soda, in the proportion of ten ounces of soda to two pounds of soft river water to each pound of ivory, is poured over it. This is allowed to remain for 36 or 48 hours, after which the solution is to be poured off, and the ivory washed several times in cold soft water; after this it is to be again immersed in a solution consisting of three-quarters of a pound of sulphate of soda and two pounds of salt water to a pound of the ivory, and allowed to remain 5 or 6 hours. Two ounces of hydrochloric acid, previously diluted with four times its weight of water, are then to be stirred in, and the vessel covered with a tight-fitting cap, and allowed to remain 36 hours. The liquid is then poured off, and the ivory plates well washed and dried in the air. Should the desired degree of whiteness not be obtained by one operation, it can be repeated until successful. As the gases generated during the process are injurious to the lungs, it will be readily understood that the operation should be conducted in the open air, or in a chimney, where the fumes can be carried off.

JAPANNING.

It would occupy far too much space to enter into the details of japanning, as there is a great diversity of treatment in the colours and substances used, and though a few recipes could be given for japans applicable to smooth polished metals at once, the same could not be done to wood.

I propose, however, to explain the science of the art with a few hints; a little practice will reveal the remainder.

Supposing, then, the substance to be japanned consists of wood; the first thing to be ascertained is whether it is perfectly smooth and level—if not, so much the worse, for then it will have to undergo the operation of

Priming.—The common priming composition consistsof strong size and whiting; the whiting is used to give body, and to conceal the surface of whatéver it is laid upon. If it can be afforded, by all means improve the composition by substituting parchment size, a little isinglass, &c. The work should be prepared by washing with hot size, diluted with about two thirds of water. Of course the work should be well cleaned.

The priming must be brushed over perfectly even and smooth, and before the last coat is laid on the work should be smoothed with fine glass paper. The last coat is then laid on, and if when dry it will receive the water polish—that is, if after passing a moistened sponge over the work, there are no inequalities, but all takes the water evenly and smooth—why, then so much for the priming.

If, however, the wood requires no priming, the work will be much more durable, and the varnish less liable to peel off; omit the priming, therefore, when possible. Give the wood a coat or two of varnish, and then mix the colour (finely ground in spirits of turpentine) with varnish, and carefully form the ground. Shellac varnish is perhaps the best to mix the colours with, if the yellow tinge of that varnish is not injurious to the colour used.

It is, in fact, the choosing of the varnishes which causes the sink or dabble; for if we want a white ground, there is no strong varnish but what will spoil and deprave the white, while that the varnish should be strong and durable, and that the work wear well, is the proper test of the art.

By the same reason the purity of a blue or even a bright red is injured by the best varnishes, or rather was,* for we have now a colourless varnish—and the strongest too—and this is a great benefit to japanners.

Still, the above remarks are not out of place, for there are very few japanners who know or care anything about the colourless varnish, though they may manufacture all they use themselves.

To return. The ground should be painted upon—or ornamented, gilded, or otherwise. If painted, the colours should be mixed with varnish, if possible; if this is not fluid enough, oil, and when dry, coat after coat of varnish should be given—from five to seven is the average. Seedlac is the strongest varnish; and when sufficient varnish has been applied to bear the polish, polish it with a piece of cloth, dipped in tripoli, using a little oil towards the end of the operation, and afterwards oil alone, until a beautiful gloss has been obtained.

If the substance japanned is metal, it should be stoved previous to the polishing, but on wood heat can be but sparingly applied. If the article be wood, keep it in a warm room until hard, then polish.

Japan for Bright Metals.—We often see this japan (or coloured varnish), it being very common, and extensively used on tin candlesticks, water-cans, tea-caddies, &c. It consists of Brunswick black (coal tar, thinned with turpentine and strained), thinned to the proper tint with turpentine. It should be applied quickly with a camel-hair brush, and stoved.

Brilliant Blue Japan.—This is a very pretty japan; we see it on meat covers, tin ware, and, latterly, I saw it on the bright work of a velocipede—for all of which it is very suitable. It is effected by a colourless oil varnish (copal), Prussian blue, and turpentine. The Prussian blue should be ground in oil, mixed freely with turpentine, and the varnish added to the desired tint. It is best stoved. In both these recipes the metals must be very bright and clean.

Worcestershire Sauce.

Intervals

The proportions of a string which will give all the notes of the Major scale.

Consider the string which gives the "Keynote" to be made up of 360 parts.

Proportions.	1	$\frac{8}{9}$	$\frac{4}{5}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{3}{5}$	$\frac{8}{15}$
	Keynote.	Second.	Third.	Fourth.	Fifth.	Sixth.	Seventh.
No. of parts	360	320	288	270	240	216	192

Octave or Eighth. $\frac{1}{2}$
180

Consonances

1	$\frac{5}{6}$	$\frac{4}{5}$	$\frac{3}{4}$	$\frac{2}{3}$	$\frac{5}{8}$
Keynote.	Third Minor.	Third Major.	Fourth.	Fifth.	Sixth Minor
360	300	288	270	240	225

$\frac{3}{5}$	$\frac{1}{2}$
Sixth Major.	Octave or Key.
216	180

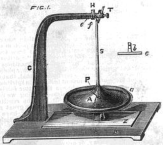
The pitch of a cylindrical pipe depends on its length. Longer, graver; shorter more acute.
The pitch of a Conical pipe depends on the proportion of the diameter of the base to its length.
Sharpen by diminishing either. Vice versa.

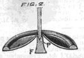
THE KYLINDOSCOPE.

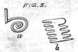
SIR,—This instrument was seen by Mr. S. Yeates of Dublin, at the Paris Exhibition. He brought one home, and made others of even an improved kind, but without any essential difference from the original model. As far as I am aware, the maker (original) is not known, and there is no name given to, or explanation of, this very interesting instrument. It might be called the "Kylindoscope," in consequence of the neat explanation of its action, to be found in its rolling analysed by the theory of "couples." What is to be said of it may be contained in two points, description and action. The explanation will be an interesting subject of speculation to some of your correspondents.

I. DESCRIPTION.—A, Fig. 1, a disc, or more strictly, a low hollow cone of brass, with thick rim *q*; S, delicate spindle of steel, passing through the top of the cone and pointed below, resting in a foot or step, with pivot hole, as shown by dotted lines, and "in section," in Fig. 2. C, fixed metallic bracket, in which are bored the perpendicular holes *d* and *e*. In *d* are fixed by the screw T the various obstacles, of which just now; in *e* moves up or down (R) a wire rod, with pivot hole (*f*) to take the top of the spindle, when the disk is to be "spun." A coiled spring keeps this pivot rod up when not required. Base of the whole instrument is B. Z a plate of polished zinc, on which the step stands. The centre of gravity of the cone and spindle, is got as near as possible to the point of support P, Figs. 1 and 2; the whole is then in equilibrium, more or less, in any position. To spin.—R is pushed down on the top of the spindles, leant over a little, a fillip of the finger and thumb causes quite rotation enough for action, but the gentle drawing of a coiled thread is much better.

II. ACTION —When spun, the spindle rises to the perpendicular slowly, more or less, as the *c* of *g* is adjusted with greater or less nicety. Now comes the singular action. If any obstacle be presented to the top of the spindle, from complete relative rest, it passes instantly to rapid motion(moving along the obstacle and searching into every hollow of it.. In a word, no matter what the shape of the obstacle, no matter in what plane it be presented, the spindle will go along every bit of its perpendicular surface. In Fig. 1, a straight bar is represented as being in position; *b* shows this bar full front, the spindle rolls along, and when it comes to the end







(*e*) of *b*, it does not go off into space, but turns along the end, no matter how sharp, and back along the second side and second end. In the spiral (*a*) Fig. 3, every turn is examined inside and outside. In the complicated Fig. (*b*) each bend is faithfully visited outside, and if there be any opening, the inside must receive the same careful scrutiny. With the instrument, but three figures are supplied. I have tried every possible form of obstacle, and always with the same result. The third point I leave to the discussion of your mathematico-mechanical readers.

E. KERNAN.

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Letter copying

Paper wetted with a solution of sugar or honey will copy writing in ordinary ink.

Another Plan

Sponge the copying paper with water in the ordinary way, and after the copy is made, submit it to the vapour of ammonia, wh. will bring out the writing with great distinctness.

Eng. Mech. /69.

A test for Lead. Caustic Potash gives a colourless precipitate. Sulphuretted Hydrogen gives black.

[351.]—INSTANTANEOUS LIGHT.—In reply to "Queer John," the instrument he alludes to is called a Tachopyrion or fire syringe. It is made of a thick glass or brass cylinder, one of the ends of which is closed. An air-tight piston is made to fit it, and a piston rod is attached to it. The combustion of the match paper (any other inflammable substance will do) is caused by the compression of the air.—N.B.—Be careful to have the cylinder long enough.—THE ROCKET.

Light. Beams of light converging in a point diametrically opposite to sun. Effect of perspective. Thomson's Meteorology p. 78

Light. Phosphorescent rays of Sun.
Thomson's Meteorology p. 37

Language — Works on. See "Marcel", "Prendergast", "Deaf & Dumb",

Lip-reading. At the suggestion of Mr. Homer I have decided to employ the word "homophene" (ὅμοιος φαίνομαι) to designate words that appear alike to the eye of a Lip-reader and to use homonym in its ordinary dictionary signification

1. The words "Logaphony" (λόγος ἄ φωνή) speech without voice) and "oralegy" Greek or Orilegy Latin (os—lego mouth reading) were proposed by Mr. Homer as names for the Art of Lipreading — but neither has been adapted although some members of the Normal Class are much in favor of using "Oralegy" If its derivation is taken from the Latin it means "mouth-reading" (os - lego) and must be written Orilegy and if from the Greek its signification is "seeing speech" (ὁράω λέγω) and must be written Oralegy

For table of Homophenous Elements see "Homophenous"

July 7th 1876

PATENT ARTIFICIAL LEATHER.

The problem of making by artificial means a valuable article of leather out of old and new Scrap-leather, and containing all the essential properties of the best natural article has often been tried, but until lately proved a failure; as the inventors did not succeed in discovering the chemicals requisite for restoring to its original vitality the animal glue in the leather, which constitute the chief strength and of which the raw hide contains so very large an amount; but which to a great extent gets deadened, or loses its original binding capacity in the tanning process.

Through the discovery of such chemicals, and their introduction in the preparation of artificial leather, has the problem of making such an article, of even more valuable properties than the best natural leather, at last proved a complete success and has been patented in this country, as also in the principal countries of Europe.

The Scrap-leather for such purpose is reduced by suitable machinery to a fine fibrous pulp, and with other ingredients of softening properties through a kneeding process, brought into a homogenious dough, in which the powerful restorative for reviving the animal glue is brought in action, and after evaporation of the surplus liquid, and after being sufficiently dry, by a very hard pressure, or between iron cylinder rollers, compressed into a fast and substantial leather, the strength, flexibility, toughness and wear of which, competes successfully with the best Oak leather; and according to repeated trials has proved to possess fully the same wearing capacity for soles, as the best part of the hide, having besides the very important property of being perfectly water-proof, and of such compactness and uniformity, that it does not require the hammering necessary in making even the very best Oak leather suitable for soles.

Its water-proof quality makes it especially valuable for pump-leather, as well for cold as hot water, and also for harness, as even a continued exposure to all kinds of weather has no effect on it, occasioning neither rot nor crack.

The following valuable properties, not combined in any other belting yet introduced to the trade constitute its suitability for Machine belting and its superiority over any other material now in use, viz:

1. It can be made endless, or of of any length, width and thickness required, and of perfect uniformity as to wear, which is generally well known to be impossible with leather belts made of shorter pieces of different hides, and of unequal wearing capacity.

2. It will stand any amount of heat and friction as well as the most intense cold—will stretch less than any other belting, and can be changed from one pully to another with ease and rapidity.

3. It is very strong and substantial in the edge, and will stand a great amount of ill use without suffering any injury, and through its combined properties, supply a desideratum much needed.

By suitable machinery for moulding, or forming the material in its doughy state into hose, fire-buckets, &c., for which purposes it is especially adapted on account of its flexibility, impenetrability by water, and its capacity to withstand any amount of hardships, as well as extreme heat or cold, it will certainly make the best, as also the cheapest material yet produced for such purposes.

By a different mixture and proportions of the ingredients, a material—Patent Leather Matting for floor covering is made, which, on account of its cheapness, its water-proof properties, and its capacity to keep the rooms protected from the cold and dampness of the ground, makes it an unequaled article for covering Offices, Passage-ways of Public Buildings, &c. It will withstand an immense amount of wear and can very easily be cleaned.

Its suitability, when made of a superior quality, for covering submarine telegraph cables, will no doubt be firmly established in a near future, the inventor being already engaged in experiments to that effect, having been encouraged to such by scientific and professional men.

This manufacture is, however, yet in its infancy, and will, first in course of time be employed for the manufacture of the numerous articles for which it is so well adapted; but it is easy to conceive that in the course of its progress, and by the improvements it may yet receive by scientific and practical enterprise, it will find fully as many uses as India Rubber, and be a source of wealth to those, who with sufficient energy and capital, will carry the manufacture of it to what it beyond a doubt will prove itself, one of the most important manufactures of the world.

The cost of the materials employed in its manufacture amounts to about 11 1-7, 13½, 16 1-5 and 19 cts. per lb. for the different qualities, besides from 12 to 14 ounzes of Scrap-leather, which prices, calculated after the present rates of the raw ingredients, would be reduced at least 10 to 15 per cent by a direct importation in larger quantities.

The process of manufacture is very plain and comprehensible, and the whole work, even to the most minute parts, easily controlled by a little experience, assisted by the complete information furnished to the purchaser of rights.

The enormous quantities of scrap-leather hitherto thrown away by shoe and harness manufacturers as valueless, in addition to the offal from tanneries, and the millions of shoes of all kinds annually worn out, fully illustrates the importance of this discovery, and furnishes material sufficient for the manufacture on the most extensive scale, of this unequaled article of Artificial Leather.

Communications in regard to negotiations for the entire Right, or State Rights, should be addressed to P. J. McKenzie Oerting, Pensacola, Florida. Assignee for the Patent in the United States.

[EXPRESS PRINT.]

Mouth Glue

Isinglass or Gelatine (pure) melted with a little moist sugar, and ~~very~~ little water. Form in thin cakes by pouring while hot on slightly greased glass, and when cold cut in strips.

This can be very conveniently used if, cast into the form of a small wheel about $\frac{3}{16}$ths of an inch in breadth, and mounted by its centre in a handle, having two legs at the end next the gum to keep it when lying down, from touching the table. The wheel is to be run over the work to be gummed; which has previously been wet.

M.M.B.

[782.]—MARINE GLUE.—The following is a good recipe for making marine glue:—Digest from 2 to 4 parts caoutchouc, cut into small pieces, in 34 parts of coal tar naphtha, promoting solution by the application of heat, and by agitation. The solution when formed will have the consistency of thick cream. To this add 62 or 64 parts of powdered shellac, and heat the mixture over the fire, constantly stirring it until complete fusion and combination has been effected. Pour the mixture while hot on plates of metal, so that it may cool in thin sheets like leather. In using the glue put it in an iron vessel, and heat it to about 248° Fahrenheit, and apply it with a brush to the surfaces to be joined.—IRISH MECHANIC.

[1103.]—MICROSCOPE ILLUMINATION. — The cheapest and easiest way of illuminating a microscope is by getting a small common paraffin lamp and mixing with the paraffin about 40 or 50 drops of spirits of camphor, which gives a wonderfully brilliant steady light, and can be used with equal advantage for reflected and condensed light.—W. H. CULSHAW.

Moon. Elements of — see Cosmos Book I note 40.

Moon. Apples shaken from the tree during the time of the Full-moon in October are said to keep through the winter. The bruise is supposed to dry up so as not to spoil the apple.

W. James Mitchell (Farmer — Brantford Ontario)

Mountain Systems of Asia.

1st North Eastern to Behring's Straits.

2d Hindoo Koosh west to Asia Minor

3d Muz-tagh or Karakorum
East & South-east merging into the Himalayas.

Keith Johnstone p. 9.

Mountain Systems of Europe
1. Hesperian 2. Alpine 3. Sardo-Corsican
4. Sarmatian 5. British 6. Scandinavian
Keith Johnston.

Mountains. Centre of the three great Asiatic Systems — Mountain of Pamir or Bolor.
Keith Johnston J.-G.

Manipulator. Braidwood in Edinburgh used an instrument consisting of "a small round piece of silver, of a few inches long, the size of a tobacco pipe, flatted at one end, with a ball, as large as a marble, at the other" — to aid in placing the tongue of the pupil in the right positions.
Extract from Vox Oculis Subjecta in Amer. Annals of the D. & D. for April 1848 p. 189.

Marcel, C. Knt. Leg. Hon., Works by M. —
1. Language as a Means of Mental Culture and International Education
2 vols. octavo - London: Chapman & Hall 1853
2. The Study of Languages brought back to its true principles; or The Art of Thinking in a Foreign Language. New York - D. Appleton & Co. - 1869.
3. Premiers Principes d'Education.

Miscelanea

Curious Experiments.

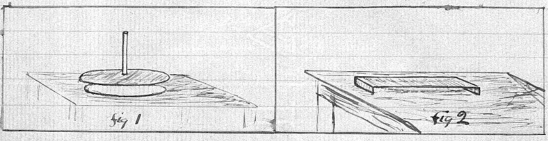


fig 1 fig 2

1. Take a piece of Cardboard about two or three inches in diameter. Make a small hole in the centre, and fasten into it the end of a quill. Hold this little instrument about half-an-inch from the table (as in fig. 1.), having placed under it a piece of paper.

On blowing down through the quill the paper will rise and adhere to the cardboard.

2. Invert the Instrument and lay the paper on the top. The paper cannot be blown off by means of the quill.

3. Bend the opposite ends of a piece of cardboard so as to form two legs about ½ inch high. Lay this instrument on the table (as in fig 2).

It will be found impossible by blowing in any way, to make the card rise from the table. — True

Mc N O P R S T U V W Y

N.B. Far from there being any appearance of rising, the Card bends downwards until its centre touches the table. (as indicated by the dotted lines (fig 2).)

Memorandum

From the "Feminine Republican Club"
to A. G. B.

"Who came to see us when pleasure was rife,
And ~~sowed~~ among us the seeds of strife,
And made two friends to be foes for life? — ?
— — Mr. Bell!"

Braeside, near Paris, Ontario
Sept. 17th 1873.

From A. G. B.
To the "Feminine Republican Club".

"Oh! who would sunder friend from friends,
Or pleasure take in endless strife?
I'd rather these two hearts should blend
And yield to me One Friend for life,
Who, Ah, Who?"

Brantford, Ontario
Sept. 18th 1873

Electrical Experiments by A.G.B.

1. Intermittent current of Electricity passed through an empty helix of insulated wire — causes a sound in the coil. When the electrical pulsations are very rapid — a clear musical note proceeds from the coil — the unison of the note produced by the Transmitting Instrument. When two or more Transmitting Instruments are employed to transmit pulsations of different pitch simultaneously to the coil the two or more notes can be perceived ~~the~~ by placing the ear against the empty helix.

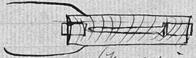
Two ~~Bichro~~ Grove Elements employed — ~~Helix~~ Resistance of Helix about 120 Ohms.

2. A ~~1/2~~ wrought iron nail introduced into the coil emitted quite a loud crackling sort of noise (Pitch of Transmitter Low). On holding the nail in the fingers so that no portion of it touched the helix — the crackling noise changed to a musical note — the unison of the transmitted pitch.

3. A piece of clock-spring (steel) held within the coil gave forth a crackling sound. On gradually drawing the spring through the fingers so as to leave a shorter and shorter end within the coil — the crackling noise changed into a musical note when a certain point had been reached.

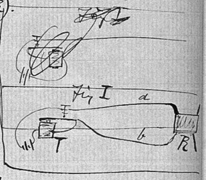
4. Two wrought iron nails introduced into the coil vibrated against each other reproducing the sound of the transmitting Instrument.

5. A wrought iron nail was introduced into the coil between two iron cylinders (which projected slightly from the two ends of the coil). A loud musical note was the result.



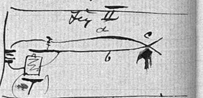
(These experiments were made in Nov. or Oct. /74 AGB)

6. A Transmitter was arranged as in (T.) (March /75)
Current was passed through Rhumkorff Coil (R).
Wire (a) being fastened to one of the thick wires of the coil, and (b) to one of the thin wires.
There was thus no metallic communication between the wires (a) and (b) in the Coil. Quite a loud sound proceeded from the coil (R). It was the unison of the sound at (T).



7. Experiment varied by substituting an ordinary tin-foil condenser for the coil (R). A loud sound proceeded from the Condenser.

8. Wires (a) an (b) were crossed as in Fig II.
The one vibrated against the other reproducing the note of T — even when the insulating material intervened. A bright spark accompanied the vibration showing that the sound was due to an induced current from the electro-magnet of T.

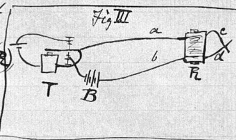


N.B. A peculiar smell was noticed in this and the following experiment — probably indicating the formation of Ozone. AGB

9. A Transmitter was arranged as ~~shown~~ shown in Fig III.

~~The current from a & b were passed~~

The wires (a) & (b) were fastened to the thick wires of a Rhumkorff Coil (R) and the thin wires (c, d,) of the coil were lightly crossed with insulating material between.



The sound of the Transmitting Instrument was reproduced by the spark that passed from c to d.

On holding the bare end of (d) near to (c) ~~the~~ as to ~~allow~~ compel the spark to traverse as much space as possible the sound became very loud.

The experiment was repeated with about 15 or 20 Grove elements (?). — ~~the spark~~ (d) was held about $\frac{3}{4}$ inch from (c). A sensibly continuous stream of flame passed from (d) to (c). The note of the Transmitting Instrument was reproduced so loudly that it might have been heard over the largest hall.

Two Transmitters used simultaneously (with battery of 4 elements) produced a seemingly continuous stream of fire — from which proceeded a double tone.

(March & April 1875
Noted May 17th ~~187~~ 1875. AGB)

10. Deduction. — From these experiments (1, 6, 8) I conclude that an intermittent current of electricity creates a molecular vibration in the conductor through which it is passed. This would explain experiment I. — the number of coils would intensify the movement sufficiently to be audible. We can ~~imagine~~

each particle of metal to be turned in a particular direction when a current passes — and to return to its place when the current ceases.

11. A groove 3 feet in length, was made in a piece of wood and filled with mercury. ~~the~~ The current from one of the Transmitters was passed through the mercury. A very faint sound ~~was~~ was heard to proceed from the mercury.

N.B. The sound was so faint and other noises so loud that experiment needs verifying. (May 22^{d} - [7]5)

(Attempts to verify hypothesis in note 10)

12. Passed current from Transmitter through a copper wire which was held closely against the ear. No noise was perceptible.

13. Passed current through iron wire held against ear. Clear musical note perceptible.

14. Passed current through (a) steel spring, (b) iron hammer (c) block of iron — In all these cases a musical note was perce[ptible]

15. Current passed through brass — no sound.

16. Current passed through carbon (taken from the porous cell of a battery - dry) — Clear musical note perceptible.

17. Current passed through Plumbago — (connections made with the two ends of the lead in an ordinary pencil) Musical note perceptible.

18 A strip of brass connected with one pole of the battery was held closely against the ear. ~~while the wire from the other pole~~ was pressed against

Contact was made and broken with the other wire. No sound was perceptible. Accidentally – on touching one portion of the brass with the wire – a musical note was heard.

After long experiment to reproduce this note – it was again heard. On examination it was found that the wire was resting on a little spot of wax on the brass slip. One side of the strip was then coated with wax. Musical note clearly perceptible – especially when the wire was ~~[illegible]~~ made to scratch over the surface.

19. A strip of brass connected with the one pole of the battery was laid against another strip of brass connected with the other pole – a layer of wax separated the two ~~plates~~ strips. On holding them to the ear – musical note was perceived.

20. The current from the Transmitter was passed through the thick wire of an Induction Coil – and experiments 18 and 19 were repeated using the Induced current.

It was then perceived that in (19) it was necessary that the ~~slips~~ fingers should bridge over the space between the slips.

21. One of the strips (mentioned in 19) was held in a handkerchief and pressed ~~closely~~ against the ear. The other slip was laid on the table at some distance. On touching the second slip with the finger. The first ~~strip~~ emitted a musical note.

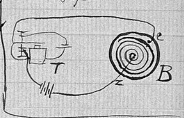
(N.B. Experiments 12 to 21 were made this afternoon May 24th
AGB)

22. Another experiment with mercury.

The lid of a ~~[illegible]~~ collar-box (B) had melted wax poured into it. A spiral of paste-board was introduced into the liquid wax and the wax as then allowed to harden.

Mercury was poured in and battery connections made at, C, and Z.

Fig IV

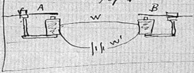


~~No~~ No sound was perceptible — although occasionally it seemed as if a crackling noise could be heard. The outside noises rendered this experiment indecisive.

When an iron wire was substituted for ~~the~~ the copper one at C a sound was heard, — this was probably caused by the vibration in the iron wire and ~~not by~~ ~~mer~~ only secondarily by mercury-vibrations (see Exp. 13).

23. Current passed through a cup of mercury in which was floating a piece of iron. Faint noise perceptible.

Fig V



24. Upon plucking the spring of A (Fig V) ~~the~~ musical note was heard at B. (wires W + W' about 200 feet long). When the spring of B was tuned ~~to~~ in unison with A, it vibrated with considerable amplitude every time spring A was plucked.

25. The same effect ensued, only in a lesser degree, when there was no battery in the circuit at all.

26. When the spring, B, was removed and the ear placed against the core of the electro-magnet no noise was perceptible when the spring A was plucked. Nor was any sound heard from the spring B when it was held firmly so as to prevent it from vibrating.

AN ANTIDOTE TO NICOTINE.—A bit of news is given by the *Lancet* which will be welcome to hygienists and smokers. M. Armand, a French *savant*, has stated to the Academy of Sciences that he has discovered a sure antidote to nicotine. Success has thus crowned the efforts which he has been making for the last few years. The antidote is nothing else than common watercress. It destroys the poisonous effects of nicotine, and yet does not alter the aroma of tobacco. A solution of watercress may, therefore, be employed for steeping the leaves of tobacco, and would thus effectually divest them of their noxious properties; moreover, a draught of the same will act as a sure antidote to nicotine.

See Tobacco

Oh!

A WONDERFUL FREAK OF NATURE.

THE ORIGIN OF SPECIES ILLUSTRATED BY A FRENCH PTERYGANTHROPIAN.

(From the Special Correspondent of the New York World.)

PARIS, Dec. 19.—I hasten to send you a translation of M. Harnois-Condamine's article in the last number of the *Revue des Merveilles Scientifiques*, about which learned Paris is all agog. M. Harnois Condamine is professor of Physiology in the College of de Francis I., is a well known writer upon subjects appertaing to his branch, and also upon ethnology; and it is commonly believed that the fearlessness with which he has pushed his investigation and his boldness in announcing radical opinions in science, have alone prevented him from becoming a member of the Institute. It will be seen that he speaks of a brother of M. Foglin as having emigrated to California and being probably alive there now. I trust that your scientifice gentlemen will make some enquiries in regard to the man, in order, if he can be found, to ascertain if the physical abnormalities noted in his brother exist also in his person. It is if the utmost importance to this age to determine at once whether the human race be really a constant species or one that is progressively developing new physical traits and therefore susceptible of infinite improvement in physical mental, and moral regards. M. Harnois Condamine's article is as follows:—

Charles Darwin's latest, and in some respects most remarkable, work on "the Expression of the Emotions in Man and the Lower Animals" satisfies me that it will not be out of place now to publish a brief narrative of my acquaintance with M. Foglin and his family, and an account of the post-mortem examination which Dr. Bravais, of Montbrison, and myself made on his body on the occasion of his unhappy death, September 19, 1871. Some particulars of the autopsy and the remarkable abnormalities revealed by it are already known in a conversational way to several of my confreres in the profession. The excuse which I have to offer for the antecedent details is that I believe the conditions of a man to be in some sort the work of his character and circumstances. I attach an almost infinite value to what astronomers are pleased to call the "personal equation." Three forces are equally and coordinately active in man -the psychical force of the will, the nervous force that reacts under it, the muscular force acting in obedience to the nervous impulsion. The "personal equation," which is only a more accurate expression for what is called individuality, is capable of infinitely modifying psychical force, consequently of also modifying the nervous and muscular actions. Having no exact means for measuring the personal equation, we can do no more than make a concrete statement of what seems to us to be the elements that go to compose it in any particular case. With this object in view, I give such imperfect details of M. Foglin's life, person, and character as I have been able to gather, eliminating of course from the statement everything except what seems to bear upon the abnormal variations in his anatomy which the autopsy revealed. I forbear nearly everything like comment, preferring that people should determine the value of the facts for themselves, and I eschew the use of scientific terminology as faa as necessary precision will warrant.

For the past seventeen years I have been in the habit of spending my summers in the mountains of Auvergne, making my headquarters the little town of Lagnevilliac, which is one day's ride from Issoire. Usually, for twelve years past at any rate, I have taken my residence with M. Andre Foglin and his family, their house being about a mile from the village and commodious. M. Foglin had a certain fondness for me, and was my frequent companion in mountain excursions. He was a man well to do, cleverly educated, and of a force of character only exceeded by his remarkable physical prowess. He was the descendant of a Scotch Highlander, who came from Dornoch, in Sutherland, after the defeat of Prince Charles Edward in 1745, being then a married man, with one son. He died in 1780. His son, in 1760, married a Mlle. des Rosier (a paterna aunt, by the way, of that daring and adventurous balloonist Pilatre des Rosier, who came to such a tragical end in 1785), and settled in Auvergne, where the family have ever since resided. M. Foglin's father, who was still living, though bed-ridden, when I first knew the family, a visionary and hypochondriacal person, had chosen to embrace literature for a profession, went to Paris, but soon failing in health (and perhaps also in fame) returned to Auvergne, having published nothing save a clever metrical version of the "Birds of Aristophanes," that is still occasionally looked into. He became very eccentric in his latter days, imagined that his hair was being changed to feathers, and that he was turning to a fowl He refused to answer unless addressed as M. Dindon, grew pale at the very mention of truffles, and one Christmas, fancying the cook was after him, escaped out of the window and fractured his hip so seriously that he was never afterwards able to walk. His wife, a sensible woman, not well educated, was the daughter of an Auvergne water-carrier who had grown rich by the clever employment of his herculean strength in Paris, mounting more stairs and carrying more pails than any two of his comrades. Mme. Foglin determined that Andre should not fall into the errors of his father. He inherited her sturdy health and frame, and only permitting him a modicum of book-lore in childhood, she educated and developed his muscles most systematically. When Andre died he was the best swimmer in France. At Besancon once, for a wager, he seized a large anvil and flung it sheer over a house two stories high. Andre was the youngest of five children, all sons, and all eminent for the same strength and for a certain adventurous habit of mind. It will be curious to know what becomes of these, whom I have not met, none of them being in France. One died in China; one was in Sonora with Raousset de Boulbon, and is supposed to be now living in California; one, who had great mechanical talent, invented a peculiar windmill, the operations of which he is now superintending for a company at Saardam; the fourth is a cure in the Vosges. Andre, his mother's favourite, remained at home and obtained the paternal estate, which his mother's money had redeemed from mortgage.

When I first knew Andre he was about nineteen years old, but fully grown. His figure was not good, for he was short, with apparently no waist; but his arms were very long, his shoulders broad, and his chest round as a shield, and sonorous, when he smote it, as a cask. When stripped no one could fail to notice the resemblance of his body to a barrel, nor the enormous development of the pectoral muscles which lay in solid masses over his rounded ribs and sternum, nor the great folds and rolls of muscle that corrugated his back and shoulders and coiled like bunches of great serpents along his arms. His legs were not greatly developed, but by reason of his remarkable strength of wind he was a superb cragsman and unequalled in a footrace. He was never known to be out of breath in the longest climbs; and I once saw him run down a full-grown hare that in vain endeavoured to escape him.

When he captured the breathless animal, which yielded to him from sheer exhaustion, he was apparently as fresh as when he started on the course. To complete this portrait you must poise on a neck rather long a square, solid head, eyebrows that jutted over eyes like a hawk's and with the hawk's preternatural clearness and strength of vision; a proud, fierce, aquiline nose; a small, sweet mouth, a ruddy complexion, and profuse red hair and beard. Indeed, his Highland blood, mixed with that of Auvergne, made him a very hairy man; his chest being matted with it, and his arms almost covered. His gate was peculiar; he seemed to walk as much with his arms as with his legs, swinging them in the air violently till they flew like the yards of a windmill in a gale. When he ran this motion increased till he appeared to be actually propelling himself in the air like a swimmer who goes through the water hand over hand He insisted that this contributed sensibly to his speed, and used laughingly to say that Virgil was all wrong in depicting his light Camilla skimming over the plain, "for," he said, "to be able to skim lightly over a plain one must have large arms and flap them like the ostrich when he runs."

I hardly know if I can describe Andre Foglin's character. It was made up of contrasts, being inherited both from his father and his mother. The soul of the visionary burgeoned strangely upon the rude practical stem. A man of the soberest, steady practice in life, careful and thrifty in affairs, he was a dreamer and enthusiast in secret always He liked the sombre imaginative English literature above all things, and used to say that Shakespeare's "Tempest" was the divinest work of man's conception. The only poetry of ours that I ever heard him quote was that exquisite song of Beranger's, "Si j'etais petit oiseau." His voice was unusually strong, shrill, strident, but, singing this, it became sweet and soft, with a touchingly plaintive melody as of regret.

In our frequent mountain excursions, when he was free to express himself and let his inmost feelings have vent, I have seen him lie upon the rocks, face upwards, for hours, staring at the sky. If he saw an eagle—and he saw objects long before my eyes could catch them—he grew fretful, impatient, as if he envied the bird its flight in the free, pure, blue air. But I am writing a sketch, not a memoir, and I must restrain my pen.

One other trait I may notice in Andro: His pulse was naturally quicker by several beats than the average pulse. This I attribute to the fact that he habitually ate food that was largely carboniferous. So fond of fats and gravies was he that I nicknamed him Samoied, and used to tell him that his proper habitat was somewhere in the neighbourhood of the North Cape.

Andre farmed the little estate at Lagnevilliac with great success. When his mother died in 1869, he married—I must tell the truth—a coryphée of the ballet, who, like myself, had come to pass the vacation among

the mountains. Leaving her profession out of the count, "M'lle. Nina" (her real name was Jeanne Levisse), was a very proper person. Her great beauty inspired Andre with the sudden passion that so often seizes enthusiasts. She married him, and though she was less domestic than the good wives of Lagnevilliac usually are, she made Andre happy.

When the Prussian war broke out Andre raised a company of Francs-tireurs, of which he became lieutenant. They were attached to the command of Garibaldi and did brave service. Andre was passionately patriotic and a heroic soldier. His herculean strength and his wonderful endurance became famous, so that the Uhlans heard of him with dread. His outpost duties enabled him to come in contact with them often, and he destroyed the lives of a great many.

On picket one morning, between Vesoul and Dijon, with five of his men, a dozen or more of the Uhlans came suddenly upon him. He shot one with his rifle; the next minute a lance transfixed him from breast to back. He broke the weapon short off, snatched the butt from the trooper's hands, beat him from his horse, sprang upon it, and escaped with two feet of the weapon in his body. In hospital at Lyons, whither he was sent to die, the wound healed definitively, and he was discharged to go home. But the lung was pierced and there was no cure for that. His health failed, his active habits were broken up, the disasters of his country preyed upon his impatient spirit, and he fell into a consumption. He imagined that there some foreign substance in his lung left there by the lance, and in his last days repeatedly urged me to dissect him after his death and ascertain what it was that had given him such pain and heaviness. He made it a condition in his will that I, assisted by Dr. Bravais, should make a post-mortem examination of his body. And so, September 18, 1871, he died, leaving one child, also called Andre, aged a little over one year.

No sooner did M. Bravais and myself proceed to the inspection of the body than its extreme emaciation enabled me to perceive that its abnormalities were much greater than I had supposed. M. Bravais at once exclaimed: "How could a man so preternaturally strong at the same time be so pigeon-breasted?" And in fact the sternum, which extended nearly to the navel, was ridged in the middle like a duck's breastbone. I showed my colleague what a brace and purchase this must have been for the enormous pectoral muscles, now wasted and shrunken. We proceeded to make a regular and close autopsy, organ by organ.

M. Foglin's body measured as follows:—

	Metres.
Height	1.57
Breadth across shoulders	.76
Around chest (in health)	1.54
Length of arm	.86
Length of sternum (from juction of clavicle to tip of ensiform cartilage)	.35

[The metre is 39.37 inches.]

The great departure of these figures from the average measurements of men of such height will at once be perceived. The cranium was not marked by any peculiarity, although I thought the bone somewhat thinner than is usually the case. The brain weighed 1.19 kilogrammes. The neck we found to be much longer than it appeared in life, there being a more decided convexity in the cervical arch than is ordinarily found. The spinous processes of the sixth and seventh cervical vertebræ, and of all the dorsal vertebræ, were widened and stouter and more tuberculated than generally occurs in the human skeleton. To our surprise we found some of those dorsal processes anchylosed together, so as to make portions of the spine almost inflexible.

The dissection of the shoulder disclosed to us such a degree of abnormality that we were fairly startled. The clavicle was long, almost straight, and at least a third larger in diameter than in the largest men. Its articulation with the shoulder was a wonder of strength. The shoulder-blade, buried and imbedded in a mass of muscles, was trowel shaped, the inferior angle being pointed and curved inward. It was nearly twice as long as the average scapula, thicker, and its edges, surfaces, and processes not near so smooth as in nature. Cutting through the great cushion of the pectoral muscles, still an enormous mass in spite of the subject's emaciation, we found the thoracic cavity almost arched up with bones abnormally disposed, the sternum, extending to within half a decimetre of the umbilicus, was more proportionally widened, the superior and second bones were sharply ridged on the interior surface, and the xyphoid was longer and entirely ossified. The ribs were long, perfectly arched, and very elastic; upon the right side there were thirteen; and the false ribs described much more of a circle than is usual, covering in the upper part of the abdomen. This explained the barrel like shape for which M. Foglin's torso was remarkable. The intercostal muscles were unusually large, especially the intercostales interni. There were also evidences of immense contractile force in the superior abdominal muscles.

The diaphragm of the subject was remarkably thin and pallid, and in view of his unusual powers of breath it must be concluded that the major part of his respiration was conducted by means of the thoraic muscles So slight and fragile a diaphragm could not, I am satisfied, have produced the immense dilation which his massive iron-bound chest was capable of, nor could it have sustained the pressure of the deep inspirations M. Foglin sometimes drew when making his extraordinary muscular efforts. Among the other muscles which were abnormally large we noted particularly those of the arm, from the deltoid down through all the flexors and extensors, the trapezius and rhomboid muscles of the back, and likewise the scaleni.

There is not much more needs to be said about this dissection. We found one lung entirely destroyed, the other in a bad condition, and the rest of the viscera more or less sympathetically affected.

The fearful wound M. Foglin had received was found to be such as no one but a man of extraordinary vitality could possibly have survived, even for a week.

Now, returning to the subject that is uppermost in my thoughts, what are we to conclude from the extraordinary anatomical variations I have detailed? Without going further (as I presently shall), what conclusion would the rational comparative anatomist be likely to draw from such a series of abnormal features in a human frame, each one separately taken a departure from the human type, yet all of them concurring in the same direction towards another type? Would he not say, if these variations were susceptible of being perpetuated, if they were crescent, not decrescent, that we have here precisely the point of departure of a new species? I certainly think so. If the constancy of species be a law of the universe, M. Foglin's anatomical peculiarities indicate a mere sport of nature, of no account except as a curiosity, since it cannot go further. If species are not necessarily constant, why may not man vary as well as the dove? Why may not this day witness the beginning of a new race? What do these abnormalities in M. Foglin's case make towards? Palpably towards endowing a man with a new mode of motion. The development of the arm, the lengthening of the shoulder-blade, the enclosure of the thorax, the weakening of the diaphragm, the tremendous new purchase and force given to the pectoral and dorsal muscles, all these are changes from the human type, and towards the bird type. They mean nothing, they are simply deformities and excrescences, if they do not mean that. The arm I dissected was either an abortion or it was the beginning of the frame-work of a wing. The pectoral muscles, the thoracic changes, were a burden and a hardship, or else they were the commencement of a new phase of physical development looking towards the establishment of a winged race in the remote future.

Some philosopher, speaking of man, has said: "We have had fins; we may have wings." Now supposing (not for the sake of any hypothesis I have, nor to maintain any thesis, but merely for the sake of suggestion) supposing that mankind have nearly reached that point of development in which wings are to appear, what would be the progress? First, certain abnormal individuals not winged, but with anatomy and habits approximating to the winged type would appear. In the course of time their offspring, or other abnormalities, would approach it still nearer. These peculiarities being crescent, not decrescent, and in certain ways advantageous, would not vanish but be perpetuated. Intermarriages would develop the type by each parent transmitting to and uniting in the offspring the features which he or she severally possessed.

Finally, the winged type established in a few individuals, sexual union would gradually extend it, until there was a race of winged men. With what rapidity the process would go on in men we cannot determine until we are able to determine the transmuting power of the psychic forces over the inferior forces in the human frame, If fright can kill, if intense will can avert decay, the degree of this force acting unconsciously and continuously will not be easy to measure nor to over-estimate.

Nor must we lightly conclude that it will be an impossible thing for the human arm to develop into a human wing capable of flight in the air. Recent investigations into the mechanism of flight have quite exploded the extravagant conjectures of Borelli, Navier, Babinet, Reaumur, and others in regard to the enormous comparative superiority of the muscular force of birds over that of man. The Chevaller Chabrier, as far back as 1823, established that the elasticity of the muscles was as important a function in flight as in strength. The researches of Jurin, of Strauss-Durckeim, of De Lucy, of Prechtl, of Wagner, of Koster, and of Marey, have established by myographic tests that the static force of birds' muscles does not exceed that of the muscles of mammalia. The strength of the extensor muscles is not exerted further than to maintain the wing in the position for flight; the wing is drawn into motion by the great pectoral muscles of the bird, which weigh one-sixth of the total weight of the bird. Marey's experiments, made with the greatest care, show that, in proportion to its diameter and volume, the pectoral muscles of the bird were not stronger than those of a man. Given, therefore, a proportionate elongation and strengthening of a man's arm, a proportionate development and corroboration of the thoracic machinery, and what is to prevent a man from flying? Hastings has already formulated the relation between the surface of wings and the weight of body to be supported; and Hureau de Villeneuve has estimated that a bat the size and weight of a man would be enabled to fly with wings less than three metres in length.

But enough of conjecture. Let us return to facts. Whether we are contemporary with the dawn of a new species or not is a premature question. What we know is the chief matter. I know that the pterygodetic tendency which existed in my friend Andre

Fog'in has been transmitted to his child, and in a crescent shape. I have several times examined this boy with great care. The infant Andre's frame is the counterpart of his father's. The arm, thorax, muscles, and all have the abnormal features noted above. But, in addition to this there are two new features which M. Foglin did not possess, and which bear the young Andre several degrees nearer to the bird type than his father was. The boy has a rudimentary third eye-lid distinctly marked. When I showed it to the worthy M Bravais, who stoutly repudiates Darwin, he did not know what to say. I said nothing; I say nothing now. The boy has, moreover, what is either a rudimentary wing or else a wretched deformity. The skin of the back and arm of the child when he is at rest lies in a loose fold under his arm posteriority; when the arm is raised and extended it is seen that there is a continuous connection—a triangular flap of skin from half-way of the triceps extensor muscle to the latissimus dorsi!

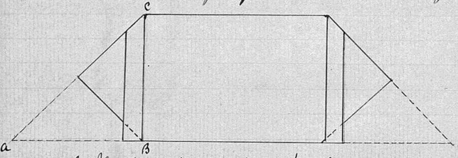
If the young Andre Foglin shall live I charge myself with his education.

ARNOIS-CONDAMINE.

P R S T U V W Y

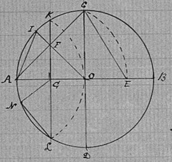
A simple and expeditious method of putting up Powders, Seeds, Sand, Shot &c in Neat Paper Parcels without risk of leakage.

1. Take a piece of paper, longer than it is broad, and fold one long edge to within 3/8 of an inch of the opposite one; turn back over it the projecting 3/8 in. and to make secure fold both over again to the same depth (3/8 in).
2. Turn the paper over so that you have the plain side towards you, and the ridge at the top of the other side.
3. Turn down towards you the right and left hand top corners, so that the <u>ends</u> may be flush with the <u>bottom</u>.
4. Turn <u>up</u> the right and left hand bottom corners, and tuck them well up under the flap. (Make <u>bottoms</u> of the corners flush with the **inner** edges of the vertical ridges.)



a B must be flush with B.C. inside the ridge.

How to find the side of any regular Polygon wh[ich] may be inscribed in any given circle.



Let A C B D be the given circle

K. L. is the side of an inscribed Triangle
A. C. " " " " " " Square
C. E. " " " " " " Pentagon
A. O. " " " " " " Hexagon
K. G. " " " " " " Heptagon
A. I. " " " " " " Octagon
L. N. " " " " " " Nonagon
O. E " " " " " " Decagon
N. G. " " " " " " Undecagon
A. G. " " " " " " Duodecagon.

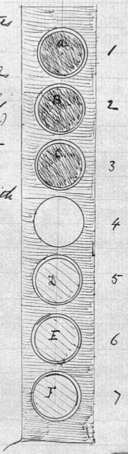
[500.]—ORNAMENTAL PICTURE FRAMES.—Take 11lb. glue; to this add one pint of water; dissolve the glue in a pan on the fire, constantly stirring to keep the glue from burning until dissolved; in another vessel put 7lb. resin, adding one pint raw linseed oil. Put this on the fire until both are mixed together. When these are thoroughly reduced, mix the whole together (glue, resin, and oil), then pour into whiting, ground very fine, and knead well together until made into a nice consistency for putting into the mould (about 28lb. of whiting for this will be required).—G. R. J.

[498.]—COLOURING PHOTOGRAPHS.—"W. H., Dalston," will find the following the most simple method:—Begin by washing some ox gall over the photograph with a clean camel hair pencil; when this is dry it is ready for painting. Ordinary water colours are used if they are good. Winsor and Newton's moist water colours are best. By mixing carmine, vermilion, and gamboge, more or less of either, as the case may be, any required local flesh colour can be made. With this give the face a flat uniform wash, and let it dry. Now, with a very small sable hair pencil, stipple in the half shadows about the forehead and lower part of the face and neck with cobalt mixed with a little Chinese white. In the same way put in with carmine the colour on the cheeks, taking care to let it fade nicely into the local flesh. For the deep shadows use Indian red or vandyke brown and purple madder mixed. The hair, background, drapery, &c., are all treated in the same manner, by first washing them over with their local colour and shading them with their proper shadow colour, taking care always to let the latter be much warmer than the former. A little gum water should be used in the deep shadows, which gives to them a retiring effect that cannot be otherwise gained. —R. W. WILLIS.

[218.]—COATING PLASTER CASTS.—The French mode of coating plaster casts with wax is as follows:—Lay on with a soft brush, the cast being perfectly dry, thin coats of hot melted white wax until it ceases to be absorbed. Then, when quite cold, hold a hot plate of iron, or, for large articles, a brazier of lighted charcoal, so near to all parts that all the outside wax shall be entirely absorbed, and the operation will be complete. The plaster will then be dull, and a tolerable representation of white marble. Objects treated in this manner may be exposed out of doors in a garden without damage, and will always preserve their whiteness. I fear, however, that this or any other method would be of little avail within the influence of London smoke, but they would bear carefully washing with a soft brush.—HENRY W. REVELEY.

Problem

Place three red and three white counters on seven circles, as drawn.
A man of either colour may move towards the enemy's position one step at a time, or round an enemy if the space beyond him is empty. No man is allowed to move backwards. The problem is to cause the red men to change places with the white.

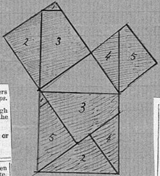


Solution.

The numerals in the figure refer to the circles, and the letters to the men.

Move	C	to	4
	D	"	3
	E	"	5
	B	"	4
	A	"	2
	D	"	1
	E	"	3
	F	"	5
	C	"	7
	B	"	6
	A	"	4
	E	"	2
	F	to	3
	A	to	5

Mechanical demonstration of the truth of Prop. 47 of Book 1st Euclid.



1. Where a word is to be changed from small letters to capitals, draw three lines under it, and write *caps.* in the margin.
2. Where there is a wrong letter draw the pen through that letter, and make the right one opposite in the margin.
3. A letter turned upside down.
4. The substitution of a comma for another point, or for a letter put in by mistake.
5. The insertion of a hyphen.
6. To draw the letters of a word close together.
7. To take away a superfluous letter or word the pen is struck through it, and a round top *d* made opposite, being the contraction of *deleatur*, to expunge.
8. Where a word has to be changed to Italic draw a line under it, and write *Ital.* in the margin; and where a word has to be changed from Italic to Roman, write *Rom.* opposite.
9. When words are to be transposed three ways of marking them are shown; but they are not usually numbered except more than three words have their order changed.
10. The transposition of letters in a word.
11. To change one word for another.
12. The substitution of a period or a colon for any other point. It is customary to encircle these two points with a line.
13. The substitution of a capital for a small letter.
14. The insertion of a word or a letter.
15. When a paragraph commences where it is not intended, connect the matter by a line, and write in the margin opposite, *run on.*
16. Where a space or a quadrat stands up and appears, draw a line under it, and make a strong perpendicular line in the margin.
17. When a letter of a different size to that used, or of a different face, appears in a word, draw a line either through it or under it, and write opposite *w.f.*, for wrong fount.
18. The marks for a paragraph, when its commencement has been omitted.
19. When one or more words have been struck out, and it is subsequently decided that they shall remain, make dots under them, and write the word *stet* in the margin.
20. The mark for a space where it has been omitted between two words.
21. To change a word from small letters to small capitals make two lines under the word, and write *sm. caps.* opposite. To change a word from small capitals to small letters make one line under the word, and write in the margin *lo. ca.* for lower case.
22. The mark for the apostrophe; and also the marks for turned commas, which designate extracts.
23. The manner of marking an omission, or an insertion, when it is too long to be written in the side margin. When this occurs it may be written either at the top or the bottom of the page.
24. Marks when lines or words are not straight.

The foregoing specimen, when corrected, would be as follows:—

ANTIQUITY, like every other quality that attracts the notice of mankind, has undoubtedly votaries that *reverence* it, not from reason, but from prejudice. Some seem to admire indiscriminately whatever has been long preserved, without considering that time has sometimes co-operated with chance: all perhaps are more willing to honour past than present excellence; and the mind contemplates genius through the shades of age, as the eye surveys the sun through artificial opacity. The great contention of criticism is to find the faults of the moderns, and the beauties of the ancients. While an author is yet living, we estimate his powers by his worst performances; and when he is dead, we rate them by his best.

To works, however, of which the excellence is not absolute and definite, but gradual and comparative; to works, not raised upon principles demonstrative and scientifick, but appealing wholly to observation and experience, no other test can be applied than length of duration and continuance of esteem.

Antiquity, like every other quality that attr/cts the notice of mankind has undoubtedly votaries that reverence it, not from reason/ but from prejudice some seem to admire in discriminately whatever has been long pr/served, without considering that time has some, times co-operated with chance: all perhaps are more willing to honour present than past excellence: and the ~~the~~ mind contemplates gen/s through the shades of age, as the eye ~~views~~ the sun through artificial opacity/ the great contention of criticism is to find the faults of the moderns, the beauties of the ancients.

While an autor is yet living, we estimate his powers by his worst performances: and when he is dead, To works, however, of which the excellence is not gradual but absolute and definite and comparative; to works, raised not upon principles demonstrative ~~and scientifick~~, but appealing wholly to observation and experience, noother test can be applied than length of dration and continuance of esteem.

we rate them by his best./ 23

1 caps
2 a/
3 ∂
8 Ital.
4 ,/
17 wf
6
3 ∂
5 H/
9 trs
7 ∂
10 iu/
11 surveys/
12 ⊙/ 12 ⊙/
13 T/
14 and/
15 run on/
16 h/
16|
18 Break, or New Par or ¶
9 trs
4 ,/
9 trs
19 stet
24
20 #
21 Sm caps
22

Prendergast — Thomas. Author of:—
The Mastery of Languages; or, the Art of Speaking Foreign Tongues Idiomatically,
London. Richard Bentley 1864
(See "Deaf & Dumb" — & "Language")

Propagation of animals. See Budding of animals.

Pestalozzi's Method — See "Manual of Elementary Instruction — containing Object Lessons.
by E. A. Sheldon. New York, Scribner & Co. 1867

Page's Interrupter (see end of D.)

R S T U V W Y

Vibrations per Second from the lowest pitch of Sound up

1
2
4
8
16
32
64
128
256
512
1,024
2,048
4,096
8,192
16,384
32,768
65,536
131,072
262.144
524.288
1,048.576
2,097.152
4,194,304
8.388,608
16,777.216
33.554,432
67,108,864
134,217,728

2d.

and consists of one hour's instruction daily in Articulation and Lip-Reading. Members of this class are expected to have some proficiency in the art of Lip-Reading, as instruction will be given orally. Terms for the course, $50, payable in advance.

Members of this class who desire instruction in other branches of education than Articulation and Lip-Reading can obtain it by applying to graduates of the School of Vocal Physiology.

IV. CLASS FOR DEAF MUTES.

Conducted by Mr. Bell, assisted by members of the Normal Class for Articulation Teachers. The full course of instruction extends from Jan. 8 to May 16, 1877, and consists of one hour's instruction daily in Articulation and Lip-Reading.

Terms for the course $50, payable in advance. Private instruction can be obtained in all branches of education from competent teachers connected with the School of Vocal Physiology.

PRIVATE SCHOOL FOR DEAF CHILDREN.

For particulars, address, Miss ABBIE A. LOCKE, 751 Tremont Street, Boston.

V. PRIVATE INSTRUCTION

Given to stammerers and others with defects of speech. Young children, if stammerers, will not be received as pupils, unless accompanied by some older person who can carry out Mr. BELL's instructions practically at home. It is also advisable, in such cases, that attendance at school be discontinued during the course of instruction, as the nervousness attending oral recitation before a class is apt to interfere with the progress of the pupil in mastering his defect. Parents of stammering children can be set in communication with teachers of articulation competent to carry on privately the education of their child. Terms for private instruction in articulation, $50 per course of twelve lessons, payable in advance.

Arrangements can be made for Lectures to be delivered in schools and colleges by Prof. A. GRAHAM BELL or Prof. BUTTERFIELD, to whom all applications should be made.

Principals of institutions for the deaf, parents of deaf children, and parents of children with backward or defective speech, can be put in communication with competent teachers of articulation.

Graduates and undergraduates of the School of Vocal Physiology are requested to inform Mr. Bell of any change in their address, and to notify him when they are out of employment.

~~Institutions for the Deaf desiring articulation teaching are requested to send to the school competent teachers to learn the system.~~

All of Prof. A. MELVILLE BELL's works upon speech can be obtained upon application to Mr. James P. Burbank, Salem, Mass.

to extreme Violet Light.

268,435,456
536,870,912
1,073,741,824
2,147,483,648
4,294,967,296
8,589,934,592
17,179,869,184
34,359,738,368
68,719,476,736
137,438,953,472
274,877,906,944
549,755,813,888
1,099,511,627,776
2,199,023,255,552
4,398,046,511,104
8,796,093,022,208
17,592,186,044,416
35,184,372,088,832
70,368,744,177,664
140,737,488,355,328
281,474,976,710,656
562,949,953,421,312
1,125,899,906,842,624

Rainy Seasons between the tropics.

Rain falls during day — not night.

Morning clear 10 a.m. Cloudy 12 noon Rain &c &c clouds vanish at sunset. Somerville's Phys. Geog. p. 66

"Rain falls rarely during the night within the tropics. Somerville's Phys-Geog. p. 67.

Shooting Star falling over a blank portion of sky while Aurora was present — made sky kindle up immediately. Cosmos. p. 116.

Sullivan. Currents produced by the vibration of metals (Archives de l'Electricité tome I, p. 480)

see "Grove".

Soldering Wire

Moisten the parts to be joined, with soldering acid, after cleaning with sandpaper. Wrap round the join a small piece of tinfoil and hold a lighted match underneath. In a few seconds the foil will melt, and leave the join well soldered and as strong as the wire itself.

Eng. Mech. June/69

Silver, to preserve from tarnish.

Clean the articles well and brush them over with thin collodion diluted with spirits of wine. This ought to keep the silver as bright as at first for at least a year, without re-application if lying by. When wanted for use, the coating is easily rubbed off in a few minutes. This method soon pays the cost of materials by its saving of silver. Eng. Mech. June/69

Snow. Limits of perpetual snow. Snow line highest about 20° from Equator. Higher on Granite Mountains than on Limestone. Thomson's Meteorology p. 45.

Sentence Method of teaching the deaf and dumb
See Annals for Nov. 1868 Article – "A Better Method of Instructing a Class of Beginners" – by M. L. Brock, A.M.
See Annals for October 1869 Article – "On the Acquisition of ~~Language~~ by Deaf Mutes" by Prof. Edward A. Fay. M.A.

S T U V W Y

Spirit Photographs, and Modes of Producing Them.—The impudent hoax of pretending to produce photographs of the disembodied spirits of the dead seems to have excited an amount of interest amongst our Transatlantic friends altogether disproportioned to the occasion. A trick so easy to enact should not have excited more wonder than the sleight-of-hand effects of the commonest street juggler. The imposture has appealed, however, to the domestic feelings and credulity of an impulsive people, and so acquired some interest, and the recent failure to convict the photographer Mumler has endowed the matter with factitious importance. The daily press of America has made the matter the subject of leaders, and our photographic contemporaries are rife with allusions to the subject, and methods of producing the results. Although the art of producing secondary imperfect images, mixed up with the portraits intended, is not a very valuable one, a knowledge of some of the methods may be useful, as suggesting what to avoid. Dr. Woodward, writing to our Philadelphia contemporary, says:—"The trial in the case of the so-called spiritual photographic swindle in New York City is creating a great excitement through the whole country. I have read the testimony of the witnesses thus far, and have not yet, in all the processes given, for taking ghosts, seen the one which I consider the one practised by the defendant, although the processes given will undoubtedly produce ghosts as stated. I have been in the habit of taking ghost pictures for my own amusement, by a process in which the deception is complete. It is this:—1. Select a transparent and colourless plate of glass, containing considerable alkali in its composition. 2. Place this plate in a rather strong solution of caustic potassa for a few hours. 3. Clean the plate perfectly with water and rottenstone. 4. Select an adhesive collodion, and take a negative in the ordinary way, on this plate, of some one whom you wish to appear as a ghost. In finishing, dry it very thoroughly, using sufficient heat to make it quite hot. Omit varnishing. (The person to appear as the ghost may be dressed in a shroud or in ordinery apparel, and may be taken in full or in part by proper vignetting appliances). 5, Remove this negative picture by scouring with rottenstone and water until the plate is apparently perfectly clean, and store away for future use, after marking the side on which the picture has been taken. 6. Take a picture yourself (or hand this plate over to any photographer, and allow him to take a picture) in the ordinary way, of any one you please, on the side thus prepared; on development the last picture will come out very distinct, while the former will appear as the ghost. The theory of this process is this:—The kind of glass selected is attacked and etched very slightly by the potassa solution, so that in making the first picture (ghost) the coating of collodion and iodide of silver, after drying, adheres with such tenacity to the granular surface of the plate that no ordinary amount of scouring will completely remove the silver compound, although the plate appears to be perfectly clean and transparent. It is this invisible coating that gives the ghost, while the collodion and silver last applied give the ordinary picture. Old plates steeped in strong nitric acid for a few hours, so as to dissolve away every trace of the former silver coating, fail to give ghosts." The respectable members of the photographic profession, in New York especially, are naturally very indignant at the abuse of their art and the escape of the impostor. Some of them undertook to produce the so-called spirit photographs under the closest inspection, without the immediate means being detected, even by those who were aware that the trick was intended. The Photographic Section of the American Institute has passed a resolution condemning the trick, and expressing surprise at the decision of the magistrate.—*Photographic News.*

Soldering without fire

~~Sentence~~ Method of teaching Deaf Mutes.

W. Brock says (Annals Vol. XIII page 209) "It has been proved in this ("the Illinois)" Institution that a class will learn twenty-six sentences more easily than twenty-six letters!"

Signs—Language of —— used by North Amer. Indians
See Annals of D. & Dum. Vol. IV p. 157 (April 1852)

Signs — Elements of the Language of —
see Annals Vol. V p. 83.

Sentence method of teaching Deaf-Mutes.

"The Abbé Chazottes, of Toulouse, formed the theory that all words should be taught in complete sentences" Annals Vol. XVII No. 3. &
There is an outline of his theory, with copious specimens of his lessons, in the Fourth Paris Circular. (Quatrième Circulaire de l'Institut Royal des Sourds-Muets de Paris, 1836.
see page 149 and on.)

~~Sullivan~~ — Currents of Electricity produced by the vibration of metals,
~~Archives de l'Elec l'Ect~~
Archives de l'Electricité t. 10. p. 480
Paper on same subject in Phil. Mag. for 1845 — p. 261

Seebeck. "*Ueber die Magnetische Polarization der Metalle und Erze durch Temperature-Differenz"

Poggendorff's Annalen Vol. VI - p. 269.

(When ~~the~~ compound bar of bismuth and antimony is heated at the junction of the two metals — a peculiar sound was heard to accompany the deflection of the galvanometer needle). Referred to by Sullivan in Phil. Mag. 1845.

Sound produced by magnetization or by telegraphic means.

For references of articles upon this subject or upon anything bearing upon it see over — a few pages near the end of ~~[illegible]~~ S.

Page 1837 verified 1838 by Prof. Delezenne — [illegible] Wartmann 1844 Marian Beatson, Gassiot De La Rive [illegible] Phenom. Prof. Wartmann 1846

~~Sounds~~. Relative frequency of the English Elements of Speech.

See "Frequency &c."

Sound transmitted telegraphy

List of works bearing upon the subject.

Kuhn — Encyclopaedia der Physik — Electricitaetslehre pp. 1014 — 1021

De la Rive — Treatise on Electricity — Vol I p. 300.

Steinheil Telegr., München 1838; Bayr. Kunst- u. Gewersbl- XXVIII 20-26

Bayr. Kunst- u. Gewerbsbl. XXVIII 25-26

x ~~English Pat. Spec. 6th May 1845 Nr. 10655~~ ~~photetone & Professor~~ no connect

Comptes Rendus XXI, 526.

x ~~English Pat. Spec.~~ 7th Oct. 1847 Nr. 11894. (Dujardin no connect.

London Journal XXXII, 402;

Polytechnic. Journ. CX - 16. — Engl

+ ~~English Pat.~~ Spec. 15th Nov. 1852 Nr. 750 (~~...~~ J. Mirand no connect

Bull. de la Soc. d'encourag. 1854 p. 165

Cosmos IV, 43 — Du Moncel Exposé II, 125.

Du Moncel III - 83.

Glösener, Traité général etc. p. 350 f.

Glösener a. a. O. p. 355 f

C. G. Page - Silliman's Journ. July 1837 — ~~...~~ p. 354) see Page's interrupter

Arch. d. Sc. phys. et nat. XI, 348.

Dove - Repert. VI, 58,

Pogg. Ann. XLIII, 411 —

Berl. Ber. I, 144

Arch. d. Sc. phys. et nat. XVI, 406.

(d) Dove Repert. VI, 58.

(over)

3 Marrian — J. P. — Inst. 1845, p. 20 —
" " " Phil. Mag. XXV 382, (3d. series) 1844
" " " Arch. d. l'Elect. V 195.
4 Beatson — Arch. d. l'Elect. V 197.
6 De la Rive — Arch. d. l'Elect. V 200
" C. R. XX 1287
" Pogg. Ann. LXV, 637.
7 Matteucci — Inst. 1845 p. 315
" Arch. d' l'Elec. V 389
8 Guillemin C. R. XXII — 264
" Inst. 1846 — p. 30
" Arch. d. Sc. phys. (2) I, ~~196~~ 191
9 Wertheim C. R. XXII — 336 and 544
" Inst. 1846 p. 65 & 100
" Pogg. Ann. LXVIII, 140.
6 De la Rive C. R. XXII — 432,
" Inst. 1846 p. 83
10 Wartmann, Prof. Elie — C. R. XXII p. 544
" Phil. Mag. XXVIII, 544 (3d. ser.) 1846
" Arch. d. sc. phys. et nat. (2) I, 419.
" Inst. 1846 p. 290
" Monatsber. d. Berl. Akad. 1846 p. 111
" Bull. de Brux. XIII — I, 320.
11 Janniar — C. R. XXIII, 319.
" Inst. 1846 p. 269.
" Arch. d. Sc. phys. et nat. (2) II 394.
4 Beatson, W — Arch. d. sc. phys. et nat. (2) II — 113

6 De la Rive — Ann. de Chim. et de phys. XXVI – 158.
" Phil. Mag. XXXV – p. 422 –
" Pogg. Ann. LXXVI – 637.
9 Wertheim. G. C. R. XXVI – 505 –
" Inst. 1848 p. 142
" Ann. de chimie et de phys. XXIII, 302,
" Arch. d. Sc. phys. et nat. VIII, 206.
" Pogg. Ann. LXXVII – 43,
" Berl. Ber. IV, 121.
12 Joule, J. P. – Phil. Mag. XXX, 76, 225
" Berl. Ber. III – 489 –
13 Laborde C. R. L. 692
" Cosmos XVII 514.
16 (Reis)? (Telephonie) – Polyt. Journ. CLXVIII – 185 –
" aus Böttger's Notizbl. 1863 – Nr. 6
14 Poggendorff – J. C. – Pogg. Ann. XCVIII – 192
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" Z. S. f. Naturw. VII 547
" Cosmos IX – 49.
? Wiener Sitzungsber X – 3.
? Abh. d. böhm. Gesellsch. IX (Anhang:
? Dendreke auf Petrina p. 14)
? Berl. Ber. XII – 241,
? Pogg. Ann. LXXXVII – 139.
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5 Gassiot –
Ferguson – Paper read before the ~~royal~~ R.S.S.A
April 9th 1866. New current Interruptor.

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"Nature" Vol. XIV p. 30.

Van der Weyde

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Nature Aug. 24th 1876 — "Telephones & other applications"
(Elisha Gray, Paul Lacour, Reuss.

AUTOMATIC TELEGRAPHY.

DESCRIPTION OF THE OPERATION OF EDISON'S SYSTEM—INDEFINITE INCREASE OF THE CAPACITY OF THE WIRES AND A SAVING OF BOTH TIME AND MONEY.

[From the New York Tribune.]

The automatic telegraph now in operation between New York and Washington, seems to be growing in public favor. The success of its attempt last winter to transmit the President's message over one wire in a shorter time than the Western Union Company was able to transmit it over eight wires demonstrated the merit of the new system. This system in its present form is the invention of Thomas A. Edison of Newark, N. J., who is now perfecting it. The ordinary batteries are used to generate the electric fluid, and no change is made in the system of telegraph wires on poles now in use. The peculiarity of the system consists both in the method of preparing the message and in the manner of transmitting it to the wires. The message to be transmitted is first given to a man who translates it into the characters of the Morse telegraphic system by perforating those characters in a long strip of paper. This is done by means of a machine called a perforator, which consists of a series of punches, each representing a letter of the Morse alphabet, operated by a double bank of twenty-six keys, resembling in their action the keys or levers of a chime of bells. The slip of paper to be perforated passes over a drum, and is kept in motion by a ratchet-wheel so as to receive the letters in regular sequence from the punches. An expert operator can thus perforate 50 or 60 words a minute. The perforated slip is then taken to the transmitting machine, which sends the message at the rate of 500 to 1000 words a minute. The essential parts of this machine are a drum over which the perforated paper passes, and an arm projecting over the drum and sustaining a little spring which keeps two small wheels constantly pressed upon the drum. These wheels are connected with the electric battery, and the drum is connected with the line of wire over which the messages are telegraphed, so that when the wheels and the drum are in contact the circuit is complete and a current passes over the wires. The dry paper which contains the perforated characters is a perfect non-conductor of electricity, and when it is inserted between the little wheels and the surface of the drum the circuit is broken. As the paper passes along, these wheels drop into the perforations, touching the drum beneath, and thus producing momentary currents over the wires, in the same way that they are produced by the ordinary Morse machine, but very much more rapidly. Of course, as the perforations are so arranged as to regulate the length of the connection, the result is the transmission of the ordinary dots and dashes of the telegraphic alphabet. The receiving machine, which is combined with the transmitting one, also consists of an arm projecting over a drum, upon which the point of an iron pin is pressed. The pin connects with the battery and the drum with the wires. Over the drum a strip of paper wet with a chemical solution is made to pass. Wet paper is a conductor, and as the despatch comes over the wires the flashes of electricity pass through it from the drum to the pin. These flashes decompose the water in the paper, and the oxygen thus set free at once unites with the iron pin, producing oxide of iron. This combines with the chemical substances in the paper, and the result is the production of an intensely blue rust on the point of the iron pin, which rubs off upon the paper, making alternate dots and dashes. The paper containing the message is received on a coil as it leaves the drum, and is carried to the copyists, who translate the telegraphic characters. As the messages are transmitted with such extraordinary rapidity, the capacity of the wire is greatly increased, and twenty perforating machines, each cutting sixty words a minute, it is claimed, would not crowd the wire beyond its capacity.

The great economy of this invention is said to lie in the fact that the work which requires the greatest expenditure of time—perforating and copying—is done with the least costly portion of the machinery, while the wire, in which the bulk of the capital must necessarily be invested, is left free to perform an unlimited amount of work; an increase of its working capacity meaning only an increase of the number of perforators and copyists. On the other hand, by the old Morse system, the amount of work which can be performed by a wire is limited by the ability of the operator to transmit the messages, which cannot be done faster than twenty words a minute, and in order to do more work more wires must be used.

The automatic system is not one of recent invention. It was first tried in 1848 by Alexander Bain of Edinburgh. He was unable, however, to devise any means for punching the characters rapidly, and the invention met with little favor. About seven years ago the same system was tried between New York and Boston, and means were devised for perforating about 100 words a minute. A new difficulty now arose. It was found that in consequence of the existence of what is called the "after-current," a draggled line was produced on the prepared paper instead of clear dots and dashes. For several years the best electricians tried in vain to obviate this difficulty. Mr. Edison, who finally succeeded in overcoming it, experimented during 120 consecutive nights in 1873 on the line between New York and Washington. The method which he conceived is a very simple one. It consists in placing a magnet at each end of the line in such a position that it sends a counter-current into the wire, which neutralizes the after-current, and thus the whole difficulty is obviated. The result is that Mr. Edison's machine marks the characters with perfect clearness. This method is called the principle of inductive compensation, and the claim of Mr. Edison to be considered its sole inventor is undisputed. In the words of George B. Prescott, "Mr. Edison in this respect stands above all the electricians in the world." Mr. Edison also invented the perforating machines used by the automatic telegraph. Before his invention great difficulty was experienced in perforating characters to represent the dash. It was found impracticable to cut dashes and dots with the same machine. Mr. Edison abandoned the attempt to cut dashes in the paper, but cut instead three round holes situated in the form of a triangle. The two little wheels, before mentioned as running upon the drum of the transmitting instrument, are situated side by side, and as they pass over the paper one of them drops into one of the holes intended to form the dash. Before it gets out the other wheel drops into the hole at the other apex of the triangle, thus prolonging the connection, which is still further extended by the first wheel again dropping into the third hole. Thus a dash is made. Mr. Edison is now completing a method by which ordinary Roman characters can be transmitted instead of dots and dashes. This he accomplishes by perforating a number of holes, arranged in five parallel lines, in the forms of the letters of the alphabet. Five wheels are then used to make the connection with the drum, and these dropping through the holes produce letters made up of a series of small dots on the prepared paper at the other end of the line, and these letters are perfectly legible. Five wires were at first used for this purpose, but one is now found to be sufficient to transmit 800 words a minute. When this system is perfected no copyists will be needed, as the messages will be delivered to the recipients just as they come from the instrument.

The points claimed in favor of the automatic telegraph are that it indefinitely increases the capacity of the wires; that it saves time by making a whole letter at once by machinery, instead of requiring an average of 3½ motions of the human hand to form a letter, as is the case in the old system; that it makes it possible to transmit twenty times as much matter in the same time as the old system; and that it requires only one or two skilled men in each office, most of the employés being copyists and perforators, who can be hired for $40 a month, while skilled operatives must be paid $100 a month. The system is now being tried by the British government, who invited Mr. Edison to exhibit his invention at their expense in case he was able to transmit 500 words a minute. The company, of which the Hon. George Harrington is president, intends soon to establish other lines besides that now operated between New York and Washington. There is some prospect of a line between this city and Boston, which is said to be the best paying circuit in the United States.

A considerable reduction of rates is made by the Automatic Company. For instance, they charge only 25 cents for 20 words between New York and Washington, and one cent for each additional word. The old rates are 70 cents for 20 words between the same points and three cents for each additional word. A question has been raised as to the right of the United States government to use these new lines, or any others that may be in rivalry to those with which contracts are in existence, requiring them to transmit government messages in preference to all others. The opinion of Reverdy Johnson has been taken on this point. It is to the effect that the government has a right to the preferred use of these lines, but is under no obligation to use them unless it chooses.

Tracing Paper. Mix 6 parts by weight of turpentine, one of resin, one of boiled nut oil, and lay on tissue paper with a brush or sponge

A SUBSTITUTE FOR TOBACCO.—A correspondent of a Calcutta paper makes a curious suggestion to tobacco smokers. Alluding to the alleged discovery, by a Parisian chemist, that watercress is a perfect antidote to nicotine, he says:—"It lately entered into my head to try how some of it dried would smoke. To my great satisfaction I found that, when put into my pipe, after a couple of days' drying in the sun, it had all the flavour of the best Cavendish without the treacle, and it was even stronger than Cavendish. Here, then, is a perfect substitute for tobacco, without the deleterious and deadly poison so freely contained in the latter; and it is at the same time cheaper. Watercress, with its fine stalks and leaves, when dried, requires no cutting to fit it for the pipe; and while a pound of cut tobacco ranges from 2 rs. to 4 rs., here we have an article a rupee's worth of which, when dried, would weigh more than a couple of pounds.

(See Nicotine)

TEA WINE.—This is a preparation by Dr. Thudichum, and is described in a paper read by him before the Society of Arts. To every gallon of boiling water half a pound of tea, Souchong or Congou, is added. When the tea has cooled down to a lukewarm temperature, moist sugar is added, and also a small quantity of yeast; this produces fermentation of the sugar; add afterwards a little alcohol. Fermentation then ceases, and the tea wine becomes clear and palatable.

Temperature affected by Asteroids.
Coincidence between the conjunction of the November Asteroids, and the celebrated cold days of the Saints Mamertus, Pancratius, & Servatius.
Cosmos. p. 123

Temperature. Mean temperature decreases from Equator as the square of the cosine of latitude. (Formulae for mean temperature of any latitude by Sir John Leslie, Mayer, Daubuisson, Sir David Brewster.)
Thomson's Meteorology p. 66.

Temperature. Mean annual. Equator 84° F. Pole 31° F.
(Kirwan) Dalton's Essays p. 75

Temperature. Woods, by hiding sun's rays and covering winter snows, produce greater cold than the latitude in which they grow would lead us to expect. Thomson's Meteorology p. 67

Temmermans (Anna). Blind, deaf, & dumb. A Protégé of the Abbé Carton. Education commenced when she was 20 yrs old at Inst. for deaf & dumb, and the Blind at Bruges – in Belgium.

Born at Ostend in 1818.

History of case in a (valuable) book ~~by the~~ Abbé Carton, entitled "Le Sourd-Muet et l'Aveugle"

See American Annals for Oct. 1848 p. 12.

Telegraph — Autographic Telegraph — or Pantelegraph. Invented by M. Caselli. Copies pictures or even handwriting. Full description in "Wonders of ~~Science~~ Electricity ~~and Art~~" p. 129. publ. by Scribner & Co. New York 1872.

Telegraph — Acoustic. A series of vibrating plates, answering to the strings of a a harp, has been arranged, each of which vibrates when struck by a particular sound, and sends off electricity to create at the end of a line the same vibrations in a corresponding plate, or, in other words, to reproduce the same sound.

page 142 "Wonders of Electricity" – Scribner, New York, 1872

Telegraphing without a wire and without a battery.

An Aerial Telegraph from the Rocky Mountains to the Alps.

The bill incorporating the Loomis Telegraph Company has been passed by the Senate, and with the signature of the President will become a law. The plan of Dr. Loomis, the inventor, is to telegraph from a high peak of the Rocky Mountains to the highest attainable peak of the Alps. At each point a tower is to be erected, on the top of which a huge mast is to be placed. An apparatus capable of collecting electricity is to be put upon the upper end of this

mast, by means of which on such elevation it is claimed a stratum of the atmosphere will be reached, which is charged with electricity. Ground connections, the same as in ordinary telegraphy, will be effected. This electrified stratum of the atmosphere will, as with the ordinary single wire and ground connections make a complete circuit, and it is claimed that the slightest pulsation of the electricity at one tower will produce a similar pulsation at the other. The company is to have a capital stock of two hundred thousand dollars, with the privilege of increasing the same to two millions if the interest of the company shall

require it. The business and objects of the corporation, as stated in the bill, are to develop and utilize the principles and powers of natural electricity to be used in telegraphing, generating light, heat and motive power, and otherwise make and operate any machinery run by electricity for any purpose.

Transcribed by Mr Richards
January 18th 1873

Copied from the Boston Herald.

Uranus — 2^{d} & 4th satellites revolve in a direction opposite to that of the rotation of the central planet. Cosmos p. 90

Universal Language — A project for a. George Dalgarno, (author of Didascolocophus), published work entitled "Ars Signorum" (1661) this was reprinted in Edinburgh in 1834, for the Maitland Club at Glasgow.

Universal Language. "Real Character" by Bishop Wilkins

Universal Language. Leibnitz

U V W Y

Varnish – turpentine. One gallon of oil of turpentine, to five pounds of powdered Rosin. Boil in a tin can over a stove (for safety) for half an hour. Fit for use when cool.

Eng. Mech.

Vision erect – Cause of.

Philosophers of eminence have perplexed themselves unnecessarily, in attempting to deduce erect vision from inverted images. The law of visible direction at once removes every difficulty, for as the lines of vis. dirn must necessarily cross each other at the centre of vis. dirn, those from the lower part of the image must go to the upper part of the object, and vice versa: hence an erect object is the necessary consequence of an inverted image.

Eng. Mech.

STAINS, VARNISHES, AND JAPANS.

SIR,—In reply to James Lewis and others, I beg to forward you the following :—

STAINS (WOOD).

In staining wood it should be borne in mind that it the wood is not white the stain will form a compound colour with the tint of the wood; bear this in mind when using the following stains.

BLACK.—Boil half a pound of logwood chips in two quarts of water, add an ounce of pearlash, and use hot with a brush. Afterwards take two quarts of the logwood decoction, half an ounce of verdigris, ditto copperas, strain and add half a pound of iron rust. Brush the work well with this, and go over it afterwards with oil.

MAHOGANY COLOUR.—Half a pound of madder, and two ounces of logwood chips are to be boiled in a gallon of water; brush over while hot. When dry go over it with a solution of pearlash, a drachm to a pint.

IMITATION OF ROSEWOOD.—Half a pound of logwood chips are to be boiled in three pints of water, until the decoction is a very dark red, when an ounce of salt of tartar is to be added. Give three coats, boiling hot, and then with a graining brush form streaks with the black stain. It should be varnished when dry.

RED.—Two ounces of Brazilwood, two ounces of potash, one quart of water, mix. The mixture should stand in a warm place several days, and be occasionally stirred. When required for use it should be made boiling hot, and brushed over several times, and while yet wet brush over with solution of alum (two ounces to a quart of water).

GREEN.—Dissolve verdigris in vinegar, and bru[illegible] over while hot.

BLUE.—Copper dissolved in diluted nitric acid [illegible] first to be brushed over the wood several times whi[illegible] hot, and afterwards solution of pearlash, until t[illegible] work is thoroughly blue.

YELLOW.—Brush over the work with tincture [illegible] turmeric.

In the general way the wood, after being stained, [illegible] finished by rubbing with rushes, after which it is aga[illegible] rubbed with a cloth dipped in a solution of beeswax [illegible] spirits of turpentine, and afterwards with a woolle[illegible] cloth alone.

METHOD OF PRODUCING UPON IRON A DURABLE BLACK SHINING VARNISH.—Take oil of turpentine, add to it, drop by drop and while stirring, strong sulphuric acid, until a syrupy precipitate is quite formed, and no more of it is produced on further addition of a drop of acid. The liquid is now repeatedly washed with water, every time refreshed after a good stirring, until the water does not exhibit any more acid reaction on being tested with blue litmus paper. The precipitate is next brought upon a cloth filter, and, after all the water has run off, the syrupy mass is fit for use. This thickish magma is painted over the iron with a brush; if it happens to be too stiff, it is previously diluted with some oil of turpentine. Immediately after the iron has been so painted, the paint is burnt in by a gentle heat, and, after cooling, the black surface is rubbed over with a piece of woollen stuff dipped in, and moistened with, linseed oil. According to the author, this varnish is not a simple covering of the surface, but it is chemically combined with the metal, and does not, therefore, wear off or peel off, as other paints and varnishes do, from iron.

COLOURLESS VARNISH.—Dissolve two ounces and a half of shellac in a pint of rectified spirits of wine and boil for a few minutes with five ounces of well-burnt and recently-heated animal charcoal. A small portion of the solution should then be filtered, and if not colourless, more charcoal must be added. When all colour is removed, press the liquor through a piece of silk, and afterwards filter through fine blotting-paper. This kind of varnish should be used in a room at least 60 deg. Fahr., perfectly free from dust. It dries in a few minutes, and is not liable afterwards to chill or bloom. It is particularly applicable to drawings and prints that have been sized, and may be advantageously used upon oil paintings which are thoroughly hard and dry, as it brings out the colours with the purest effect. This quality prevents it from obscuring gilding, and renders it a valuable varnish for all kinds of leather, as it does not yield to the warmth of the hand, and resists damp, which subjects leather to mildew. Its useful applications are very numerous—indeed, to all the purposes of the best hard spirit varnish.

Venus. The part not illuminated by the Sun is sometimes seen to shine with a phosphorescent kind of light. Cosmos p. 188.

Visible Speech. In the Philosophical Transactions for January 1668 p. 602 is an account of a tract by by Van Helmont, a Hollander, published in Latin and German the year before at Sulzbach, containing speculations concerning a natural alphabet, which he supposed identical with the Hebrew, imagining ~~that~~ the Hebrew characters to be in their form a picture of the modifications of the vocal organs in their pronunciation.

American Annals of the Deaf & Dumb (Oct. 1847.) Vol I, No I p. 38

VARNISHES

As a rule, all varnishes should be kept in a dry place (there may be a few exceptions), otherwise they are liable to become tacky. It should also be observed that they be applied in a dry place. Much, indeed, depends upon the state of the weather when they are employed—more than is easily credited—and the work should be kept in a warm place until thoroughly dry.

All varnishes in which spirits of wine is the menstruum should be used in a warm place.

Foremost among varnishes is the real original

FRENCH POLISH:—Gum sandarach, 14oz. and 2 drachms. Gum mastic, in drops, 7oz. and 1 drachm. Shellac (the yellower the better), 14oz. and 2 drachms. Alcohol, of 0·8295 sp. gr., 3 quarts and 1 pint.

Pound the resinous gums, and effect their solution by continued agitation, without the aid of heat.

If the woods are porous, 7oz. and 1 drachm of Venice turpentine.

If, also, an equal weight of ground glass with the gums be added, the solution will be more quickly made, and otherwise benefited by it. Before using, the wood should be made to imbibe a little linseed oil, the excess of which should be removed by an old flannel.

The varnish should be applied by saturating a piece of old soft coarse linen cloth, folded into a sort of cushion, rubbing the wood softly at first, turning the linen from time to time until nearly dry. The linen should be saturated afresh, and the rubbing continued until the pores of the wood are completely filled.

Two or three coats are generally sufficient. Do not rub hard. If the varnish becomes tacky, apply a very little drop of olive oil uniformly over the surface of the cushion.

The finishing process consists in pouring a little pure alcohol upon a clean piece of linen, which is lightly rubbed over the varnished wood, and as the linen and varnish dry, the wood is rubbed more briskly, until it takes a beautiful polish like a looking glass.

The above may be relied upon as the original and genuine French polish, it being in the "Dictionnaire Technologique," an accurate French work.

SEEDLAC VARNISH.—Wash three ounces of seedlac in several waters, dry it, and powder it coarsely. Dissolve it in one pint of rectified spirits of wine, put it in a gentle heat—shaking as often as convenient—until it appears dissolved, pour off the clear, and strain the remainder.

SHELLAC VARNISH.—Take two and a half ounces of shellac, break it into a coarse powder, put it into one pint of spirits of wine, keep it in a warm place a few days, shaking frequently until dissolved: strain.

COPAL VARNISH.—Dissolve the copal, broken in pieces, in linseed oil, by digestion, the heat being almost sufficient to boil the oil. The oil should be made drying by the addition of quicklime. This makes a beautiful transparent varnish. It should be diluted with oil of turpentine; a very small quantity of copal, in proportion to the oil, will be found sufficient.

GUM SANDARACH VARNISH.—A colourless varnish may be obtained by dissolving 4oz. of gum sandarach and 1oz. of Venice turpentine in 16oz. of alcohol by a gentle heat; it is not very hard, however.

MASTIC VARNISH.—Mastic should be dissolved in oil of turpentine, in close glass vessels, by means of a gentle heat. This varnish is extensively used in transparencies, &c.

BOOKBINDERS' VARNISH.—Five ounces of shellas are to be dissolved in one quart of rectified spirits of wine; add ten ounces of burnt and recently heated animal charcoal, boil a few minutes, subtract a little of the liquid and see if it is colourless; if not, add a little more charcoal. When colourless, strain through silk, and afterwards filter through blotting paper; if wanted perfectly pure, strain when cold.

CAOUTCHOUC VARNISH.—Digest two parts of caoutchouc, cut in shreds or small pieces, in 64 parts of rectified oil of turpentine; strain through linen cloth.

W

Y

Cog-wheel Diameters.

Fery. Num. 169.

The distance between the centres of two Cog-wheels having different nos. of teeth being given,— what must their respective diameters be to make the teeth on both wheels of equal size, and the spaces between them equal so that either may turn the other easily and freely?

As the number of teeth in both wheels taken together is to the distance between their centres so is the number of teeth on either wheel to the radius of that wheel.

Question. Let there be two wheels of equal teeth and spaces; one is to have 75 teeth and the other 33, and their centres are to be 5 inches apart, what are their respective diameters?

The sum of teeth in both wheels is 108, then

as 108 is to 5 so is 33 to $1\frac{53}{100}$ inches and

as $108 : 5 :: 75 : 3\frac{47}{100}$ inches.

Falsification of Writing Rendered Impossible.—A French paper, devoted to the paper manufacture, states that any alterations or falsifications of writings in ordinary ink may be rendered impossible by passing the paper upon which it is intended to write through a solution of gallic acid in pure distilled water. After the paper thus prepared has become thoroughly dry, it may be used as ordinary paper for writing; but any attempt made to alter, falsify, or change anything written thereon will be left perfectly visible, and may thus be readily detected.

Waterproofs.—*Times* says:—"By the way, touching waterproofs, I think I can give travellers a valuable hint or two. For many years I have worn indiarubber waterproofs, but I will buy no more, for I have learned that good Scottish tweed can be made completely impervious to rain, and, moreover, I have learned how to make it so; and, for the benefit of my readers, I will here give the recipe:—In a bucket of soft water put ½ lb. of sugar of lead and ½ lb. of powdered alum; stir this at intervals until it becomes clear; then pour it off into another bucket and put the garment therein, and let it be in for twenty-four hours, and then hang it up to dry without wringing it. Two of my party—a lady and gentleman—have worn garments thus treated in the wildest storm of wind and rain without getting wet. The rain hangs upon the cloth in globules. In short, they are really waterproof. The gentleman, a fortnight ago, walked nine miles in a storm of rain and wind such as you rarely see in the south; and when he slipped off his overcoat, his under clothes were as dry as when he put them on. This is, I think, a secret worth knowing; for cloth, if it can be made to keep out wet, is in every way better than what we know as waterproofs."

W

Y

How to make moist Water-Colours.
Collect the stamens of brilliantly coloured flowers, such as the saffron-crocus or the purple lilly, — and make a strong tincture with Spirit of wine or water. Add a small quantity of hydrate of alumina. This will attract the colouring matter and both will be precipitated. Pour off the clear, and add a few drops of acetic acid, which will dissolve the alumina, — leaving the colour pure. Wash carefully; dry by gentle evaporation. Mix with honey and a little gum, to a thick paste wh. is to be kept covered.

Wild Men. One found near Hesse Cassel, in 1344, mute when taken, but taught to speak; one in the Forest of Lithuania in 1694; others in the Pyrenees 1719; and the Hanoverian in the reign of George I.
(see Deaf & Dumb. — Monboddo (Lord))

Y

original

~~The discovery that~~ ~~musical notes~~ sounds of different pitch could be produced ~~simultaneously by [illegible] upon an~~ by the electric current.

The simultaneous production of musical notes of different pitch by the electric current.

I claim to have discovered that musical sounds of different pitch can be ~~simultaneously~~ ~~produced upon a [illegible] of a telegraphic [illegible]~~ by the electric current and to have utilized this discovery as a means of transmitting a multiplicity of telegraphic ~~[illegible]~~ dispatches simultaneously along the same wire.

The system of ~~telegraphy~~ Multiple Telegr. ~~illustrated by the apparatus, papers [illegible]~~ ~~illustrated by the apparatus~~ is based upon the discovery made by me in 1870 that musical sounds of different pitch can be ~~produced~~ transmitted electrically upon the same c

The.

$$\begin{array}{r} 16 \\ 12 \\ \hline 192 \\ 250 \\ \hline 442 \\ 175 \\ \hline 617 \\ 500 \\ \hline 117 \end{array}$$

7

200

$$\begin{array}{r} 50 \\ 5 \\ \hline 250 \end{array}$$

Telegraphic & Telephonic apparatus.

Researches in Telephony or the art of transmitting sound to a distance by the electric current.

Exhibit consists of
The Patents – three in number.
~~The history of~~ Statement of inventions
~~Researt~~ Article embodying the results of my Researches in Telephony –
Telephonic apparatus

11

Telegraphic & Telephonic apparatus – Statement of original Telegraphic & Telephonic inventions – Specification of three patents for telephonic inventions ~~tel [illegible] [illegible]~~ ~~Of~~ and ~~[illegible] original~~ statement embodying original Researches in Telephony.

~~Telegraphic & Telephonic apparatus – and papers relating to original discoveries & inventions ~~statements~~ of original researches concerning the production~~ describing of ~~invent~~ ~~& discoveries~~ in telephonic inventions & discoveries relating to original Researches in Telephony.

The telephonic ~~apparatus~~ instruments consist firstly of apparatus for the tran

The ~~apparatus~~ instruments exhibited ~~is~~ are designed to illustrate a new system of telegraphy whereby a large number of Telegraphic despatches may be sent simultaneously along ~~a single wire~~ the same circuit. ~~The~~

The instruments exhibited are designed to illustrate the production of sounds of any kind by ~~the~~ an electrical current